THE AGRICULTURAL GAZETTE OF CANADA

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WORK OF THE SEED PURCHASING COMMISSION

A BACON PRODUCTION CAMPAIGN

FARM LOANS AND LAND SETTLEMENT

DEPARTMENT OF AGRICULTURE
OTTAWA, CANADA.

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DEPARTMENT OF AGRICULTURE

The Agricultural Gazette

of Canada

EDITOR: J. B. SPENCER, B.S.A.

Issued by direction of

THE HON. THOS. ALEXANDER CRERAR

Minister of Agriculture

OTTAWA

GOVERNMENT PRINTING BUREAU

1917

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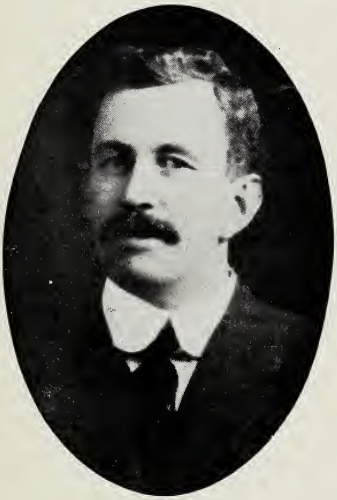
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THE NEW MINISTER OF AGRICULTURE



THE HON. T. A. CRERAR
Minister of Agriculture

ON the formation of a Union Government the Honourable Martin Burrell, who had been Minister of Agriculture in the Cabinet of the Right Honourable Sir Robert Borden since 1911, resigned and the Honourable Thomas Alexander Crerar consented to assume the office. Mr. Crerar since his earliest days has been actively and practically identified with farming. Born in Perth County, Ontario, in 1876, he accompanied his parents to Russell, Manitoba, in 1881. He received a public school education at Portage la Prairie and afterwards attended the Collegiate Institute there. Until he was nineteen years of age, he helped on his father's farm and then taught school for five years. His next step in life was to take the higher studies at Manitoba College. After finally leaving college he returned to farming, to which in all its branches he gave close application for several years. Always taking a wide and progressive view of public affairs and matters of enterprise particularly affecting agriculture, from the inception of the Grain Growers' Grain Company, Limited, at Winnipeg, he took a warm and active interest in that organization, which he has seen grow from comparatively small beginnings to its present commanding position. In the first year of the Company, he was elected to the Board and almost immediately appointed President, an office to which he was re-appointed on the recent amalgamation with the Alberta Farmers' Co-Operative Elevator Company under the title of the United Grain Growers' Limited, and which he still occupies. Mr. Crerar is also director of the Home Bank and is identified with a variety of other interests.

PART I

Dominion Department of Agriculture

INFORMATION SUPPLIED BY OFFICIALS OF THE VARIOUS BRANCHES REPRESENTED

THE DOMINION EXPERIMENTAL FARMS

THE DIVISION OF CHEMISTRY

SEAWEED AS A FERTILIZER

BY B. LESLIE EMSLIE, C.D.A., F.C.S., SUPERVISOR, INVESTIGATIONAL WORK WITH FERTILIZERS

THE MARINE ALGAE

OF the marine algae, or seaweeds, those of a bright green colour are known as *Chlorophyceae*, the brown as *Phaeophyceae*, and the red as *Rhodophyceae*. To the group *Phyaeophyceae* belong the *Laminaria* or kelps and the rockweeds, *Fucus vesiculosus nodosus*, etc., while *Rhodophyceae* includes such familiar forms as Irish or Carrageen moss, *Chondrus crispus*, and Dulse or Dillisk, *Rhodomenia palmata*. Eelgrass, *Zostera marina*—known also as "seaweed"—does not properly belong to the algae.

SOME USES OF SEAWEED

An alkaline dye—probably from *Fucus vesiculosus*—was prepared by the Romans. In northern Europe, Japan, and even on the Atlantic coasts of the United States and Canada, seaweeds such as *Laminaria saccharina* and members of the *Rodophyceae* find a use as human food, while the rockweeds, *Fucaceae*, are often eagerly eaten by cattle having access to the seashore. Knife handles and other similar articles have been manufactured from the stems of *Laminaria*, while eelgrass is extensively employed as a filling for mattresses. The once flourishing Scottish kelp industry, in which ash, known as "kelp"—valuable chiefly on account of the potash and iodine therein contained—was produced by combustion, represented one of the most successful economic means of utilizing the seaweeds. In recent years, on the Pacific coast of the United States, several companies have established factories on which some progress has been made in the extraction of potash and iodine, by processes of maceration and lixiviation, from the giant kelps which abound in that region.

Another use—the one on which our attention at present converges—is that of seaweed as a manure or fertilizer.

HISTORICAL DATA

The manurial employment of seaweed might be said to almost synchronize with the practice of agriculture. Our records of its use date back to the fourth century, A.D., at which period Palladius, a Roman agricultural authority and writer, refers to seaweed as a substitute for manure.

In Great Britain and Ireland, Scandinavia, on the coasts of Brittany and Normandy, and in Japan, the benefits of seaweed applications to the farm lands adjacent to the sea shore have long been recognized.

It is recorded that a certain Charles Mackintosh, of Crossbasket, near Glasgow, experimented with kelp (ash) on potatoes. A severe frost, in September, injured and blackened every plot to which kelp had not been applied, while the kelp plots remained in perfect foliage.

Experiments conducted by Professor James Hendrick, of Aberdeen, indicated that, weight for weight, seaweed (fresh) gave as large a yield of potatoes as that produced by manure. When acid phosphate was applied along with seaweed, the yield was, in every case, increased, while as a supplement to manure acid phosphate failed to give a corresponding increase. Seaweed with acid phosphate invariably proved more influential than manure with acid phosphate or manure alone. The produce from the manured plots was of somewhat better quality The addition of acid phosphate, whether to manure or seaweed, promoted maturity of the crops.

METHODS OF USING SEAWEED

Fresh seaweed contains about the same percentage of nitrogen as is present in rotted manure, but less phosphoric acid and more potash. Whereas in rotted manure a certain proportion of the nitrogen is present as ammonium salts immediately available to plants, that of seaweed is all present as organic nitrogen which does not become available until the seaweed has undergone decomposition and nitrification. Seaweed, however, readily decomposes in the soil. Some prefer to facilitate the process by mixing the seaweed with manure and allowing the heap to remain some time before spreading on the land, while others apply the seaweed and plough it down some months before the crop will require it.

A large proportion of the ash constituents of seaweed is soluble in water. The potash is present therein chiefly as chloride and sulphate of potash—all soluble in water.

SEAWEED-FERTILIZER INVESTIGATION AT CLARKE'S HARBOUR, N.S.

An investigation to determine the feasibility of preparing economically a nitro-potassic fertilizer by the drying and grinding of seaweed was conducted by the writer, under the direction of the Division of Chemistry at Clarke's Harbour, N.S., during the spring and summer of 1915.

The investigation was prompted by a desire to discover a partial substitute for the Stassfurt potash salts—importations of which ceased on the outbreak of the war—and was facilitated by the acquisition, through the courtesy of the Department of Naval Service, of the Dog-fish Reduction Works situated on Flat Island, adjacent to Clarke's Harbour, Cape Sable Island, N.S. Here our factory operations were conducted.

Of the Reduction Works machinery only the steam engine and rotary dryer were employed in the seaweed process. The dryer consists of a large steel cylinder—revolving on a horizontal axis—through which a naked flame passes from the wood-burning furnace at one end to the chimney flue at the other. The interior surface of the rotary dryer is fitted with longitudinally arranged shelves which alternately pick up and drop into the flame the material in its passage through the cylinder.

DESCRIPTION OF THE PROCESS

A crew of four men, equipped with a large gasoline launch and two dories, procured the rockweed at low tide, either pulling it by hand or cutting it with knives from the rocks. The round-stalked variety, *Ascophyllum* (*Fucus*) *nodosum*, predomin-

ated, but a certain proportion also of the flat-stalked rockweed, *Fucus vesiculosus,* was obtained.

The raw material, having been landed on the factory wharf, was spread on specially constructed wooden drying frames—inclined at the most favourable angle to admit the maximum drying influence of sun and wind. As these wharf drying-frames proved inadequate to accommodate all the fresh seaweed, the surplus was spread on the ground surrounding the factory and, to promote its dessication, subsequently treated by a method similar to that employed in hay-making.

A small chain and slat conveyor elevated the air-dried seaweed from the wharf to the feed-table of a large cutting machine, of a type similar to that used for silo-filling, which cut the material into lengths of approximately one inch.

From the cutter the material proceeded by means of a worm-screw to the rotary dryer, already described. On emerging therefrom the now thoroughly dry, crisp, short material was again caught in the trough of a worm-screw conveyor and discharged in the adjoining grinding room. The grinding of the material was accomplished by an attrition plate grinder with a double drive, the plates revolving in opposite directions at a speed of about 2100 R.P.M.

In appearance, the finely ground finished product bears a close resemblance to coffee.

During the brief period of our factory operations about 50 tons of the prepared seaweed fertilizer was produced. Its composition, as ascertained by the analysis of 24 samples, is shown, under the laboratory numbers of 23253, etc., in Table I.

Disregarding overhead charges, and basing our estimates solely on the prices paid for the fresh seaweed ($1.00 per ton) landed on the wharf, for coal and wood fuel, and for manual labour, the cost of production was approximately $12.00 per ton. It may reasonably be assumed that, if operations were conducted on a larger scale, the cost of production would be considerably less than the above estimate.

Unfortunately the operations were seriously impeded by an abnormally wet season, and the complete success of our process depended on a liberal amount of sunshine and drying winds. Such ideal conditions, however, are rarely of long duration in the vicinity of Clarke's Harbour, which is noted rather for its fogs than for its fair weather.

During our most satisfactory day's "run" we were able to put through—in a period of six and a half hours—the equivalent of thirty-five tons of fresh rockweed, which represented rather more than seven tons of the finished product.

In the selection of machinery for our process there was no precedent to guide us, and before the brief period of our experimental factory operations had terminated, various ways and means for increasing the efficiency of the plant suggested themselves.

FACTORS WHICH INFLUENCED THE CHOICE OF RAW MATERIALS

The choice of the rockweeds (*Fucus nodosus* and *vesiculosus* in preference to kelp (*Laminaria saccharina*) was at first induced by the greater accessibility and abundance of the supply and by the exceptionally high percentages of potash present in the samples of the former, collected in April (see laboratory numbers 20906 and 20910 in Table I), but later proved of necessity, owing to the insurmountable difficulties encountered in our attempts to satisfactorily manipulate kelp with the equipment at our disposal.

Unless very thinly spread, kelp, soon after its removal from the water, commences to putrify and, as its moisture evaporates, salts of potash crystallize out, appearing as an efflorescence on the surface of the

leaf. Unlike rockweed which, under favourable conditions, dries rapidly and becomes brittle, kelp dries out slowly and remains gummy—a characteristic which renders its subsequent cutting and artificial drying exceedingly difficult. For these reasons a departure was made from our original intention to utilize kelp —undoubtedly an attractive source of potash—extensively in our process.

Nevertheless, the belief seems warranted that, by a process of lixiviation and subsequent crystallization, the extraction of potash from kelp might prove an economic possibility.

RESULTS FROM FIELD TESTS WITH GROUND SEAWEED

That seaweeds, speaking generally, contain a higher percentage of nitrogen and potash in the winter than in the summer season is a fairly well established fact, which may in a certain degree account for the disappointingly low percentages present in our product, derived, as it was, from rockweeds collected in the months of June and July.

Recognizing, however, that the soil must be appealed to for a final verdict on the fertilizing value of the ground seaweed, the co-operation of a number of farmers, in the Maritime Provinces and Quebec, was secured, the material being used as a fertilizer for potatoes—a crop most likely to respond to a nitro-potassic fertilizer. The plan (see Table II) contained five plots of which No. 1 was a check, No. 2 received ground seaweed at the rate of 1500 pounds per acre, No. 3 the same amount of ground seaweed supplemented by 250 pounds each of acid phosphate and basic slag, No. 4 the phosphatic fertilizer alone, while No. 5 received a complete "chemical" fertilizer consisting of 150 pounds nitrate of soda, 500 pounds of the phosphatic mixture and 100 pounds muriate of potash per acre.

DISCUSSION OF THE RESULTS

Table No. II presents individually the results from eight experiments—selected geographically as examples —as well as the average returns from these and from a total of thirty-six conducted according to the plan described.

The eight experiments cited include the only one undertaken in Ontario—that at the Central Experimental Farm—the results from which must be considered reservedly, owing to the fact that plots 4 and 5 —occupying a slightly lower situation than the others—were more seriously affected by exceptionally frequent and heavy rains which occurred during the early part of the season.

Judged by the average returns from thirty-six experiments, ground seaweed alone (Plot 2) gave an appreciable increase and, supplemented by a phosphatic fertilizer (Plot 3), a quite notable increase over the yield from the unfertilized check plot. The omission of seaweed on Plot 4, which received the phosphatic fertilizer alone, resulted in a decreased yield as compared with that from Plot 3, while the complete "chemical" fertilizer (Plot 5) gave the most marked increase. It should be noted however, that in its nitrogen and potash contents, the fertilizer of Plot 5 corresponds to 2000 pounds of ground seaweed. In this respect Plot 5 is favoured and is not comparable, on an absolute basis, with Plot 3, which received but 1500 pounds of the ground seaweed per acre.

CONCLUSION

When normal, pre-war, prices for nitrogen and potash obtained, a ground seaweed fertilizer, such as our product, could not have been prepared and used economically, but, under present existing conditions—commercial potash being practically unprocurable and the cost of nitrogenous fertilizers almost doubled—the possibilities of this source seem to invite further investigation.

TABLE I. ABRIDGED

Analyses of seaweeds chiefly from the Atlantic coast of Canada, including some of those collected during the Seaweed Fertilizer Investigation at Clarke's Harbour, N.S. *Nereocystis lutheana:* Bladder Kelp. *Laminaria saccharina:* Kelp, also known as Ribbonweed or Tangle. *Ascophyllum nodosum* or *Fucus nodosus:* Round-stalked rockweed, known also as cutweed or bladderweed. *Fucus vesiculosus:* Flat-stalked rockweed, known also as cutweed or bladderweed.

Laboratory No.	No. of Samples Analysed	DATE OF COLLECTION	PLACE OF COLLECTION	NATURE OF SAMPLE	ANALYSIS OF WATER-FREE MATERIAL					
					Moisture, Per Cent	Organic Matter,	Ash, Per Cent	Nitrogen, Per Cent (N)	Phosphoric Acid Per Cent (P205)	Potash (K20) Per Cent
18993	1	Sept. 18, 1914	Nanaimo, B.C.	Nereocystis lutheana (front) dried sample	0.50	44.60	55.40	3.73	1.44	13.71
19003	1	"	"	Nereocystis lutheana (stem and holdfast) dried sample	12.00			1.01	0.73	12.87
20108	1	Jan. 4, 1915	Short Beach, N.S.	Laminaria Saccharina (whole plant) dried sample	6.08	61.50	38.50	1.65	0.95	12.93
20109	1	"	"	Ascophyllum (Fucus) nodosum (whole plant) dried sample	5.20	46.22	53.78	1.42	0.45	3.85
20906	1	April 27, 1915	Clarke's Harbour, N.S.	Ascophyllum (Fucus) nodosum, fresh sample	82.98	74.17	25.83	1.78	0.76	11.42
20909	1	"	"	Laminaria saccharina, dried sample	13.54	66.83	33.17	2.10	1.89	9.63
20910	1	"	"	Ascophyllum (Fucus) nodosum, dried sample	1.64	76.25	23.75	1.68	1.76	13.35
22657	1	July 26, 1915	"	Ascophyllum (Fucus) nodosum, light coloured young plant, fresh sample	71.08	82.01	17.99	0.94	0.57	1.65
22658	1	"	"	Ascophyllum (Fucus) nodosum, dark coloured old plant, fresh sample	74.25	78.43	21.57	1.58	0.71	2.81
23253	24	June and July,	"	Ascophyllum (Fucus) nodosum, dried and ground	7.11	76.27	23.73	1.04	0.39	2.49
23275		1915	"							
22850 etc.	*8	April, 1915 to " 1916	"	Laminaria saccharina (front) fresh sample	88.58	66.56	33.44	1.48	0.95	9.14
22851 etc.	*8	"	"	Laminaria saccharina (stem and holdfast) fresh sample	90.43	53.06	46.94	0.94	0.78	20.91
20906 etc.	*12	"	"	Ascophyllum (Fucus) nodosum (whole plant, fresh sample	73.69	74.74	25.26	1.02	0.45	3.39
22348 etc.	9	"	"	Fucus vesiculosus (whole plant) fresh sample	76.68	68.80	31.20	1.38	0.53	3.32

*Averages.

TABLE II. ABRIDGED

Results from some experiments with dried ground seaweed on the potato crop, in the year 1916. To ascertain the fertilizing value of a nitro-potassic fertilizer prepared from seaweed.

NAME OF EXPERIMENTER	ADDRESS	FERTILIZERS (IN POUNDS) PER ACRE					INCREASE OVER UNFERTILIZED CHECK PLOT (NO. 1)			
		Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 2	Plot 3	Plot 4	Plot 5
		No Fertilizer	1,500 Ground Seaweed	1,500 Ground Seaweed, 500 Acid Phosphate and Basic Slag	500 Acid Phosphate and Basic Slag	150 Nitrate of Soda, 500 Acid Phosphate and Basic Slag, 100 Muriate of Potash	INCREASE IN BUSHELS PER ACRE			
		YIELD (IN BUSHELS) PER ACRE								
Central Experimental Farm	Ottawa, Ont.	122.7	143.2	169.8	120.6	115.9	20.5	47.1	2.1	6.8
Chas. Drolet	Ste. Foy, Que.	164.3	202.3	204.3	202.3	171.3	38.0	40.0	38.0	7.0
Isaac W. Baird	Chipman, N.B.	227.5	232.5	267.5	237.5	282.5	5.0	40.0	10.0	55.0
A. T. Reid	Rollingdam Stn., N.B.	82.5	165.0	192.5	178.7	192.5	82.5	110.0	96.2	110.0
David Bacon	Nappan Station, N.S.	177.6	172.3	212.0	187.0	231.7	5.3	34.4	9.4	54.1
B. C. Fairn	Annapolis Royal, N.S.	50.0	100.0	150.0	120.0	215.0	50.0	100.0	70.0	165.0
Samuel Freeman	Amherst, N.S.	247.6	323.0	324.6	263.0	300.0	75.4	77.0	15.4	52.4
A. M. Stuart	Belle River, P.E.I.	293.3	318.3	315.0	296.7	295.0	24.7	21.7	3.4	1.7
Average returns for the above eight experiments		170.7	207.1	229.5	200.7	225.5	36.4	58.8	30.0	54.8
Average returns from thirty-six experiments		166.0	177.2	193.0	183.7	211.5	11.2	27.0	17.7	45.5

THE DIVISION OF BOTANY

PREVENTION OF FIELD AND STORAGE ROT OF POTATOES BY BORDEAUX MIXTURE

BY PAUL A. MURPHY, OFFICER IN CHARGE, FIELD LABORATORY OF PLANT PATHOLOGY, CHARLOTTETOWN, P.E.I.

ALTHOUGH it is well known that the principal rot causing loss in potatoes both in the field and in the cellar, the late blight rot, often miscalled the "dry rot", is due to the same cause as brings about late blight on the foliage. It is not always realized that spraying the foliage with Bordeaux mixture sometimes derives its principal importance from the prevention of rot developing, during, and subsequent to, digging rather than from increasing the yield by the prolongation of the life of the tops.

GROWTH OF THE POTATO

It is of course of great importance to keep the foliage in a living and active condition as long as possible. All the food which the potato plant manufactures and stores in its tubers is elaborated in the leaves, and the longer the foliage lives and functions the greater will the crop be, other conditions being equal. The importance of prolonging the life of the foliage to the utmost will be better realized if we consider the life history of the plant. In the Maritime Provinces the period of growth of the potato crop, from the time of planting until harvesting, is approximately four months. The first two months are spent in growing the sprouts, roots, stolons, stems and leaves of the plant. This is all in the nature of capital expenditure. It is as though a factory were being built which will in the ensuing two months manufacture about 1 lb. of potatoes. After the lapse of around two months tuber formation begins, and it continues as long as the plant lives. Theoretically, therefore, every week that the plant lives in vigorous condition after the manufacturing operations commence means an output of about 2 oz. per plant, or slightly more than 31 bushels per acre, the yield being assumed to be 250 bushels per acre. As a matter of fact Jones showed in Vermont years ago that of a total crop of 379 bushels 321 bushels were produced in the last 51 days of a growth period of 125 days, the average weekly increase during that time being nearly 45 bushels.



A POTATO TUBER CUT OPEN TO SHOW LATE BLIGHT ROT INSIDE

LATE BLIGHT IN THE MARITIME PROVINCES

In the year 1915 there was an

early and very severe outbreak of the late blight all over the Maritime Provinces. Most of the foliage in unsprayed fields, even in the latest parts of the country, was dead by the middle of September, in some sections much earlier, while potatoes which had been thoroughly sprayed with Bordeaux mixture remained green from two to three weeks or more longer. This lengthening of the life of the plants showed itself in experiments carried out at Charlottetown, P.E.I., on three common varieties in an average increase in yield per acre of 97 bushels of marketable potatoes.

The season of 1916 was different in character and different in the way the late blight appeared and acted. The disease never got far enough ahead in that year as a general rule to kill the tops completely, although it was present on them for from four to six weeks before digging time. In some cases it did an appreciable amount of injury to the leaves, sufficient to be measured by an increased yield in adjoining sprayed plots, in which the foliage remained intact until frost struck or the crop was dug. But several cases were observed in which the use of Bordeaux mixture did not seem to give any increase in yield. In some of these instances it was possible to store the potatoes from the sprayed and unsprayed portions of the field separately, but in the same cellar and under exactly the same conditions, when the results set out below were obtained.

TABLE I.—Control of late blight rot of potatoes in field and cellar by spraying with Bordeaux mixture; Variety—Green Mountain.

Treatment	Total yield per acre Bush.	Late blight rot in bush. per acre			Net amnt. of saleable potatoes in May Bush. per ac.	Difference in favour of sprayed plots. Bush. per ac.
		In field and cellar Oct. 1916	In cellar Oct., 1916 May, 1917	Total		
Sprayed.....	231	0	22	22	209	61
Sprayed.....	294	1	5	6	288	140
Sprayed.....	276	0	1	1	275	127
Unsprayed.	288	21	119	140	148	

It will be seen from the above table that the use of Bordeaux mixture did not result in an increased yield when the crops were dug. This was to have been expected because the late blight was responsible for little or no damage to the tops, even on the unsprayed portions, although it was generally present there. There did not seem to be any conspicuous reduction in the amount of rot found in the field in certain cases as a result of spraying, but in every case of which we have the records the spraying effected almost complete control of dry rot in storage. This was most evident in the months from October, 1916, to January, 1917, but its good effects were sustained up to the middle of May, 1917. Taking the average of the three sprayed plots there was a loss of less than 10 bushels per acre from late blight rot from harvest time to the following May, while the loss in the check plot during the same period was 140 bushels per acre. The latter figure shows that almost one-half of the crop was destroyed by rot, a very large proportion, but not as large as some of the commercial losses sustained in the same year. Authentic cases are on record in whch one-half to three-fifths of the sound potatoes placed in storage were lost owing to late blight rot.

TABLE II.—Control of late blight rot of potatoes in field and cellar by spraying with Bordeaux mixture; Variety—Cumming's Pride.

Treatment	Total yield per acre	Late blight rot in bush. per acre			Net amt. of saleable potatoes in Jan. 1917 Bu. per acre	Difference in favour of sprayed plots Bu. per acre.
		In field and cellar Oct., 1916	In cellar Oct., 1916 Jan., 1917	Total		
Sprayed 6 times	489	1½	0	1½	487½	133½
Sprayed 4 times	442	1½	0	1½	440½	86½
Unsprayed	424	66	4	70	354	

Similar results were obtained on the variety Cumming's Pride at Charlottetown, P.E.I. (Table II). The comparative figures are only available to the month of January because the unsprayed potatoes were not kept any longer, but the potatoes from the two sprayed plots combined were kept until May and the further rot which developed in them amounted to a total of 3½ bushels for the two, or an average of 1¾ bushels for each. Spraying in this case resulted in as nearly perfect control of the late blight rot as is possible commercially, the total loss per acre on sprayed potatoes up to May being only 3½ bushels while 70 bushels of similar unsprayed potatoes had rotted by January.

CONCLUSIONS

Results such as these are likely in years such as 1916 when for certain reasons the blight is not sufficiently severe to kill the foliage completely and the conditions are good for the transfer of infection to the tubers, and they are generally more liable to be obtained where the soil is inclined to be heavy and moist, and in localities in which late blight rot in storage is generally severe. In districts in which such conditions prevail potato spraying is doubly necessary, and is bound to be doubly beneficial, since it not only increases the yield but also practically eliminates storage rot, as shown by the above experiments, which were carried out under conditions known from previous experience to be very favourable to it. While as a general rule the benefits from thorough spraying are obvious in the field at digging time this does not include the full benefit, which is only seen after the crop has been stored. Whether the crop is stored by the grower or not, the improved keeping qualities will react to the farmer's benefit. In the former case if the grower holds his crop for higher spring prices good spraying will insure him against loss from rot. If he sells in the fall, the great bulk of the crop will still be stored in warehouses and it is the farmer who will eventually suffer if his own potatoes or potatoes from his neighbourhood earn a reputation as poor keepers. Farmers would do well to realize that the trade attaches more importance to keeping qualities than to practically anything else, that the keeping quality largely regulates the price, and that there is an assured market for stock free from danger of rot.

AN APPRECIATION

THE following excerpt from the presidential address before the British Mycological Society, delivered by Dr. E. W. Swanton, Curator of the Haslemere Natural History Museum, contains an appreciation of the work carried on by the Botanical Division which might serve to arouse the greater interest of the general public of Canada in this phase of work at the Experimental Farms:—

The useful mycological notes which appear from time to time in the Journal of the Board of Agriculture, are reproduced in leaflet form with an italicised foot note which informs the public that they may be obtained post free on application to the Secretary of the Board of Agriculture and Fisheries. But a system of distribution which depends largely for its success upon the publicity gained through the subscribers to a journal has obvious defects. Personally I much prefer the Canadian plan of posting them to every village in the land. The farmers' circulars, prepared under the direction of the Minister of Agriculture at Ottawa, are distributed throughout the length and breadth of Canada. I have had many opportunities lately at the Haslemere Museum, of conversing with farmers who have thrown up their occupations—all honour to them—purposely to come over and help the mother country in her time of need, and I gather from them that no expense is spared in their country in the production and distribution of mycological literature. In Canada they do not wait for a dangerous pest to arrive and make itself unpleasantly evident before they begin writing about it, but, if there be a possibility that such may come, a warning circular is sent out broadcast which contains a most excellent coloured illustration and references to a bulletin in which detailed particulars may be read. One stalwart young warrior told me that Circular No. 3 (a warning one which concerns the potato canker) is displayed in post offices in remote districts as well as in provincial towns, and he was proud to mention a certain village with a population of thirty-two which had not been forgotten by the Government. The circulars have a very attractive appearance; clear type and realistic illustrations are used with good paper or cardboard, and points of special importance are emphasized by printing them in red.

The following regulation has been passed by Order in Council under the War Measures Act, 1914:

1. On and after the first day of December, 1917, and until the Governor-General in Council has by Order declared that the present abnormal conditions have ceased, no grain of any kind and no substance that can be used for food shall be used in Canada for the distillation of potable liquors.

2. Any person violating the above regulation shall be guilty of an offence and shall be liable on summary conviction to a fine not exceeding five thousand dollars, or to imprisonment for a term not exceeding six months, or to both fine and imprisonment.

THE ENTOMOLOGICAL BRANCH

THE WESTERN CEDAR BORER, *Trachykele* sp.*

BY R. N. CHRYSTAL, FIELD OFFICER FOR FOREST INSECTS, ENTOMOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

AT the meeting of the British Columbia Forest Club on the 9th of May, 1915, Mr. Aird Flavelle of the Thurston-Flavelle Lumber Company, in the course of a paper upon the British Columbia Red Cedar, referred to the frequent occurrence of a "powder worm" boring extensively in the sapwood and heartwood of both green and dead timber; and requested at the same time that the matter be taken up with the Dominion Entomological Branch. This was followed by a direct request to the Entomological Branch, made by the British Columbia Forest Branch, as a result of which an investigation was commenced in the Fall of 1915 and continued throughout the season of 1916. The following account has been written with a view to bringing together in a concise form the results of the studies made in this problem up to date.

DISTRIBUTION

We have seen the work of this borer in the following localities on or near the coast:—Stave Lake, North Vancouver, Howe Sound, Sechelt Inlet, Pender Harbour, Nelson Island Gordon Pasha Lakes, and Powell Lake; in addition its presence has been reported to us from Malaspina Inlet. Lund and Harrison Lakes; in short the distribution is fairly general.

One correspondent remarks, however, that in his estimation the region on the western side of Puget Sound is infested much more heavily than any locality on the British Columbia coast. Mr. Aird Flavelle also states that so far as his experience goes, they have never found any worms in the timber from north of Seymour and Euclataw Rapids.



FIG. I
ADULT BEETLE,
Trachykele
(Original.)

The worm found boring in the cedar is the larva or grub of a beetle belonging to the *Buprestidae*, a family of wood borers, and to the Genus *Trachykele*, a Genus rare in our Canadian collections, and about whose life history and habits little has been known.

The adult is a beautiful, shining, golden-green beetle one half to three quarters of an inch in length, and slightly less than one quarter of an inch in breadth; the body is elongate-oval in shape, tapering markedly towards the hinder end. The shining velvety green of the upper sur ace is without any marked spots or lines of another colour; the whole surface is densely punctured and the wing covers are marked with faint raised lines and deep depressions. The under surface, also entirely green, is more shining and smoother in appearance owing to the finer punctu-

*This species is very closely allied to and perhaps identical with *opulenta* Fall; although the work of the larva is exactly of the type figured for *blondeli* Mars. by Burke in the U S. Yearbook of the Dept. of Agric. for 1909, pp. 410 and 411 and not at all like that figured by him there for *opulenta*.

ation; and it is covered with a fine grey pubescence.

THE LARVA

The larva is about one and a quarter inches in length, and cream coloured with the exception of the mouth parts which are dark brown to black. The small and more or less retracted head is followed by three broad, flat segments comprising the thorax which in turn are followed by the ten sub-cylindrical and narrower abdominal segments, the whole body tapering gradually towards the hinder end with the last segment decidedly narrower than the preceding ones.



FIG. II. LARVA OF *Trachykele* Dorsal Surface (Original.)



FIG. II. LARVA OF *Trachykele* Ventral Surface (Original.)

LIFE HISTORY

So far, despite extensive investigations in the field, little information has been collected by us regarding the period of emergence and flight habits of this species. Two specimens of the beetle are in our collection, one taken on May 22nd, 1915, at Lillouet, B.C., by Mr. E. M. Anderson, lately of the Provincial Museum of Natural History, Victoria B.C., and the other taken by Mr. J. M. Swaine, dead in its pupal cell just below the wood surface of a cedar branch, on September 12th, 1915. It is probable, however, that the adults emerge early in the spring.

It is known also that in at least some cases the eggs are laid on the branches. Small larvae have been found working downwards in branches of less than four inches in diameter, their narrow tunnels having been followed back to a point where they could not be traced with certainty. In one tree which was felled specially for examination, the larvae were working extensively in a side branch of less than ten inches diameter; and had commenced their life in that branch, as no tunnels were found leading either into or out of the main stem.

The tunnels of the borer are very irregular, in cross section, they are oval in shape and about one half by one quarter of an inch in diameter; very often, however the grub feeds irregularly on both sides of the tunnel making a wide excavation for a long distance, the tunnel narrowing down again gradually to its normal width. The tunnels are closely packed with the wood shavings and excrement of the larva. This refuse when fresh is quite white in colour but gradually darkens with the surrounding wood, until it is often difficult to distinguish the "worm holes" in cross sections of the log.

In the main stem the tunnels are found running chiefly in the heartwood, sometimes they penetrate to within a few inches of the heart of the tree. No definite data have as yet been collected on the length of the tunnels, their winding nature rendering this fact difficult to ascertain.

PUPAL CELL

The pupal cells in most cases examined were found in the branches; a few were located in the main stem just below or above a branch. The exit holes are oval in outline and are often plainly visible at a little distance.

DAMAGE

Mr. H. E. Burke, of the U.S. Bureau of Entomology, in a paper on "Injuries to Forest Trees by Flat Headed Borers," discusses briefly several species of *Trachykele*, *T. opulenta* Fall, from California which attacks the famous big trees *Sequoia gigantea*, and several species of cedar; and *T. blondeli* Mars from Western Oregon and Washington.

In connection with *T. opulenta* he mentions having found one young tree twelve inches in diameter in the famous Mariposa Grove, which had most of its wood completely riddled by successive broods of larvae, and apparently killed by this species. *T. blondeli* he reports as seriously injuring the timber of many of the finest standing trees of the western red cedar in Western Oregon and Washington; in connection with which statement he quotes the report of the Supervisor of a Washington forest to the effect that a large part of the cedar in his district was worm eaten, and that the worm-eaten trees were often green and apparently thrifty when the timber was so full of holes as to be of little value.

Our investigations in British Columbia, so far as they have gone, have shown a similar condition of things so far as the outward appearance of the affected trees is concerned. We have found cedar trees which looked perfectly sound and healthy to the topmost branch, to be so badly riddled that the wood from a point about sixteen feet from the ground was useless for any practical purpose. In contrast to this we have found larvae working in dead dry branches which had no bark on them.



FIG. III. LARVA OF *TRACHYKELE* IN SITU, IN A SMALL GREEN BRANCH OF CEDAR, NOT MORE THAN ONE AND A QUARTER INCHES IN DIAMETER (Original).

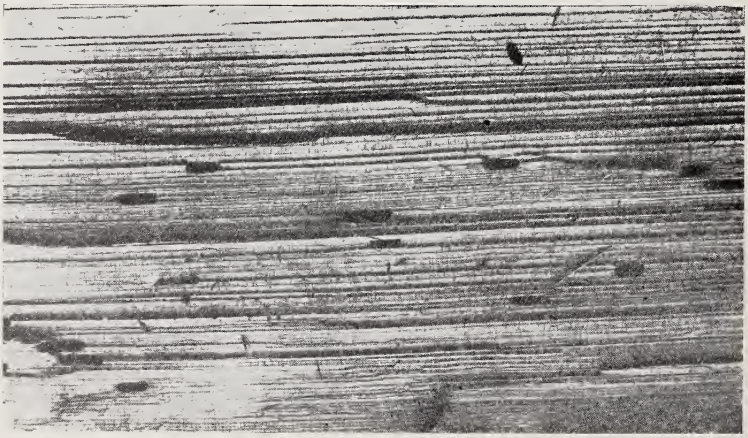


FIG. IV. SHINGLE BOLT SHOWING SEVERE INJURY BY THE LARVAE OF *TRACHYKELE*, NELSON ISLAND, B.C. (Original).

In regions where the borer has been found to be prevalent we have searched in vain for any explanation of the variations in severity which occur in cases of infestations lying contiguous to one another; in some places examined, however, we were inclined to believe that the cedar growing in low lying damp areas was more susceptible to attack than that growing at a higher elevation.

Only once in our investigations in British Columbia have we found this borer working in a young tree. The fact that sometimes old tunnels are found in butt logs of mature trees may possibly be accounted for in this way; the borers having worked in this portion of the tree when it was younger. It has been suggested that in such cases the entrance may have been through an old fire scar, but so far we have no evidence that this is the case.

So far as the injuries to the timber are concerned, generally speaking the upper parts of the tree are the more seriously affected. In this connection we have endeavoured to obtain first hand information of a practical nature, and among others we consulted Mr. Aird Flavelle who was kind enough to supply us with data on the condition of the cedar cut recently in an infested section of the country.

In one or two of the booms from this limit nearly 50 per cent of the logs which went through the mill were estimated to be more or less affected; the later booms which consisted of logs cut at a higher elevation reduced the percentage of infestation to about 20-30 per cent of the total from the whole claim.

Mr. Flavelle further informs us that the depreciation in value occurs through the reduction in the grade of the lumber; for instance instead of getting No. 1 and 2 clear lumber out of logs which are affected, it reduces the grade of the lumber produced to No. 2 common, which barely pays the cost of manufacture and allows nothing for log value, as in normal times. No. 2 common realizes from $6.00 to $8.00 per thousand at the mill, whereas $30 per thousand is a fair average price for No. 1 and 2 clear lumber.

For shingles a badly affected log is totally ruined so that the loss in timber is even greater in a shingle mill than in the sawmill. A few of the small rough top logs were sorted out and sent down to a small mill to be cut into 8x8 for railroad purposes. Quite a number of these were 'culled' owing to the excessive number of worm holes in them.

Mr. Flavelle estimates that on an average the logs from this limit were depreciated 30 per cent in value, which would make a total depreciation on the log value of this timber from 6 to 10 per cent, or say from 75c to $1.25 per thousand.

A brown stain was observed surrounding the tunnels in many cases, Mr. Flavelle states. It extended for half an inch to one inch on either side of the hole, this stain seemed to accompany the borings in every case, the two often following the course of an annual ring for a considerable distance; in a freshly cut log at a distance of 3 to 4 inches in from the sapwood a distinct brown ring was visible, marking the affected part of the log very clearly.

From what has been already stated, it will be seen that in this problem we are face to face with conditions which render any systematic scheme of control a matter of difficulty. One principle may, however, be laid down, and this applies to the control of wood boring species in general; namely, that whenever possible slash burning should be undertaken as a part of all lumbering operations. Particularly is slash burning important in the case of the species here dealt with, the larvae of which may be found in numbers in the branches and tops of trees, and its value as a general measure of prevention of forest insect injuries by bark and wood borers has already been discussed in other papers.

THE HEALTH OF ANIMALS BRANCH

EXPORT REGULATION OF CANADIAN SHEEP

THE United States Department of Agriculture has issued a new regulation governing the importation of sheep from Canada which does away with the necessity for dipping under official supervision prior to shipment. Following are the new regulations which are designated "Amendment No. 7, Bureau of Animal Industry, Order No. 209":

"All sheep imported into the United States from Canada for breeding, grazing or feeding must be inspected at the port of entry by an inspector of the Bureau of Animal Industry. They must also have been inspected by a veterinarian in the employ of and receiving a salary from the Canadian Government, and be accompanied by a certificate signed by him stating that he has inspected the sheep and found them free from disease, and that no contagious disease affecting sheep has existed in the district in which the animals have been kept for 60 days preceding the date of importation. The owner or importer shall present an affidavit that said certificate refers to the sheep in question. Any such sheep which are unaccompanied by the aforesaid certificate shall be subjected to a quarantine of 15 days."

The regulations requiring the dipping of sheep to be exported from Canada to the United States came into effect in August, 1905, when dipping twice was required, under the supervision of a Canadian official veterinarian, of sheep from districts infected with scab. In April, 1911, all sheep imported into the United States from Canada were required to be twice dipped under the supervision of an official veterinarian of Canada. These regulations remained in force until the recent order, which became effective on July 1st this year. This latest amending order is a tribute to the healthfulness of Canadian sheep and their freedom from sheep scab, the extermination of which on Canadian soil has been the constant effort of the Health of Animals Branch.

DOURINE AND ITS CONTROL

BY W. L. HAWKE, D.V.S., INSPECTOR IN CHARGE, VETERINARY RESEARCH LABORATORY, LETHBRIDGE, ALTA.

DOURINE is an important disease of horses, mules and donkeys, caused by a species of animal parasite or germ known as the *Trypanosoma Equiperdum* and is peculiar in that it is contracted or spread only by breeding. That is to say, the germs of the disease gain entrance to the body of a healthy animal, by a diseased stallion covering a healthy mare or a healthy stallion covering a diseased mare.

Dourine is known to have existed in Europe for many years and was probably introduced into America in 1882 in an imported Percheron stallion brought to Illinois. From this centre it gradually spread. Its presence first being suspected in Canada in horses in the Lethbridge district in the year 1904.

The disease, while comparatively a new one in this country, is particularly important because of the fact that since its introduction, it has more than once seriously threatened the horse-breeding industry of Western Canada, more especially that of the Province of Alberta.

In the horse, dourine infection,

more often follows a chronic course. While, it may develop and result in the death of the animal, if left to run its course, in a few months' time. In these latter cases usually sufficient evidence of the existence of a serious disease are presented, which lead to an investigation and its true nature detected. Unfortunately, as stated above, the greater percentage of infections follow a chronic course, which may extend over a period of two, three and more years. During this time no signs of disease may be observed, or if present may be so mild that they do not lead one to suspect a disease of a serious nature. Especially is this so in range horses which are, as a rule, not under close observation. During this long period the infected animal to all appearances, may appear in normal health, showing no signs of disease, at the same time quite capable of transmitting the disease by breeding contact with a healthy animal. These are termed immune carriers.

At any time during the chronic course of the infection, the disease may develop and cause a rapid breakdown in the animal, especially so when the animal is subjected to extreme conditions such as a spell of hard severe work which a farm horse often experiences in a busy season, or as a range horse in extremely cold weather, in the winter months together with poor pasture and lack of water. Conditions such as tend to lower the vitality of the animal.

METHODS EMPLOYED IN CONTROL

Dourine is one of the diseases dealt with and controlled by the Health of Anima'ls Branch of the Department of Agriculture. All premises on which the disease exists or is suspected to exist are placed under quarantine by officers of the Department. The breeding of horses thereon is strictly prohibited and their movement controlled until such time as the disease no longer exists on the premises, when the quarantine is lifted. All animals found to be diseased are destroyed (there being no successful treatment known) and a liberal compensation paid to the owner.

When dourine was first suspected in the country great difficulty was experienced in its control owing to the fact that it had spread to a considerable extent among the range horses. There being no means of detecting diseased animals other than by symptoms which might develop, required that the suspected herds be held under quarantine restrictions for lengthy periods and frequently examined by officers of the Department in order to detect and destroy the diseased. This caused considerable loss to the owner through not being able to breed, occasioning the loss of one, two or more colt crops, as well as endless work for officers of the Department in examining the range horses, which at best was hard and difficult work. Again difficult to control the suspected herds, where, under range conditions different herds intermingled to a greater or less extent. Then when a herd was released from quarantine, after a reasonable time having elapsed without having detected any further evidence of disease, it is quite possible that one or more of the so-called immune carriers remained, which it was impossible to detect, and which if present would prove a source from which disease could spread at a later date.

However after persistent work by the Department, the officers of which are deserving of the greatest credit, the disease to all appearances was brought under control and hopes appeared that it would soon be cleaned from the country. These hopes later proved false as the disease was apparently smouldering all the while, and in the fall of 1913 the most extensive outbreak yet experienced was discovered among the larger herds of Southern Alberta.

Soon after dourine was first suspected in the country a quarantine

station was established near Lethbridge, Alta., for the purpose of keeping under observation suspected cases of the disease and so far as possible to study its true nature.

In February, 1907, after exhaustive study and research work the animal parasite causing dourine was detected in, and isolated from, a naturally infected mare by Dr. Sullivan and Dr. E. A. Watson, the latter of whom was in charge of this station. While the disease existed and was dealt with as dourine for a number of years previously, both in Canada and the States, this was the first time the parasite was demonstrated in America, settling beyond all doubt the true nature of the disease. Since this discovery and after a number of years further work Dr. Watson has been able to establish a laboratory method or test, by which the disease can be detected in the blood of an infected animal. The advantages and value of this test can not be over estimated and fortunately it was possible to employ it in dealing with the extensive outbreak of 1913, abovementioned, and its accuracy having been proved beyond all question, it has been adopted by the Department as the official test for dourine in Canada.

Therefore the methods of dealing with and controlling dourine, since its introduction to Canada have made great progress. While at one time the most difficult disease to detect and control, at the present time it is most simple.

Under the present methods of control, all suspected animals are placed under quarantine by officers of the Department, and, as well, all possible contacts, which are looked upon with suspicion, traced. A sample of blood is taken from each breeding animal and forwarded to the laboratory to be tested, a laboratory having been established at the quarantine station for the purpose. Here horses affected with dourine as well as known healthy horses are kept, blood from which is used to control the testing of all suspected samples received. Any animal whose sample on being tested proves to be diseased is at once destroyed. In this way it is possible, in a very short time to detect and destroy all diseased animals in a herd, thus avoiding lengthy quarantines and its accompanying inconvenience and loss to the owner through being unable to breed. With the larger herds it is often necessary that they be tested more than once, because of the fact that it is difficult to say whether or not all animals have been gathered and tested; at the same time it is difficult to absolutely control breeding operations because of the possibility of young stallions being at large on the range. With these herds the procedure followed is to test the animals repeatedly until no diseased ones are found.

All stallions in the infected districts, so far as possible, are tested each year, so that should one become diseased, it is detected, contact animals traced and dealt with before the possibility of its having spread to any extent. As well; all breeding animals shipped from these districts are inspected by officers of the Department and any suspicious animal held until tested.

In dealing with dourine along the present lines followed by the Department, the confidence and co-operation of the horse owners has been gained, who, with few exceptions, do all in their power to assist the officers in its detection and control.

The good results obtained can be noted in the following table showing the number of animals tested each year and the gradual decrease in the percentage found to be diseased and necessarily destroyed:

Year	No. Tested	Diseased cases reacting to test and destroyed	Percentage diseased
1914	4015	512	12.7%
1915	6714	417	6.2%
1916	14114	217	1.5%
1917 (to date)	4588	17	0.37%

While dourine, at the present time, is well under effective control, it still exists to a more or less extent; but, with the continued co-operation of the horse owners, who can materially assist by reporting to the nearest veterinary officer any irregularities or suspicious signs of disease which may occur in his breeding animals, more particularly stallions used for stud purposes, which conditions will be investigated without expense to the owner, and by the present methods employed by the Department, it will be quite possible, in the course of a few years' time, to entirely rid the country of this disease.

THE SEED BRANCH

THE SEED PURCHASING COMMISSION

BY GEO. H. CLARK, B.S.A., SEED COMMISSIONER

THE rapid increase in areas under cereal crop in the Prairie Provinces has not been followed with an equivalent development of business organizations of capacity sufficient to meet the full requirements of good seed grain in years of partial crop failure covering considerable areas. The Immigration Branch of the Department of Interior has for many years provided seed grain to homesteaders on the basis of deferred payments, and on occasions have extended that distribution to all farmers who have been in need.

The condition of the wheat crop in southern Manitoba and south-eastern Saskatchewan, which had been severely attacked by rust during the summer of 1916, made it clear as early as the first of September that large quantities of seed wheat would have to be shipped into that area from the Province of Alberta, and a month later the Seed Purchasing Commission of the Seed Branch was established and at work in each of the three Prairie Provinces. The new plan for handling this difficult seed situation was authorized by the Honourable Arthur Meighen, then acting Minister of Agriculture, based on the recommendations of the Seed Commissioner. This arrangement provided that all farmers who were in need of financial support to procure their supplies of seed grain, should establish their claim to such support before the local governing body in the municipality where they lived, which governing body would be expected to assume the responsibility of financing their purchases, either directly or with the co-operation of their provincial governments.

The Seed Purchasing Commission, with headquarters at Regina, Sask., proceeded in early October with the purchase of seed wheat, for which they were authorized to pay a premium over current market prices amounting to not more than five cents per bushel. All of the seed purchased by the Commission was subject to inspection on delivery at the Canadian Government interior terminal elevators at Saskatoon, Moose Jaw, or Calgary, in which all of the seed purchased was stored and cleaned for shipment. Standards of quality for seed wheat, seed oats and seed barley were fixed by order in council and administered by the

Seed Inspection Division of the Seed Branch staff, which had two experienced inspectors at each elevator. All of the seed grain purchased was bought subject to being graded seed by these men, over whom the Seed Purchasing Commission had no direct control. In addition to inspecting the seed grain purchased by the Seed Purchasing Commission, these seed inspectors issued certificates and caused to be separately binned all grain admitted to these elevators that was sufficiently clean and good to pass the seed grades. The Seed Purchasing Commission did not have a monopoly of the purchase and sale of grain for which seed certificates were issued at these interior terminal elevators. The Commission did, however, handle a sufficient quantity of seed grain to ensure an abundant supply at fair prices.

The Commission purchased six hundred and twenty-nine thousand bushels of seed wheat, four hundred and eight thousand bushels of seed oats, and a small quantity of seed barley. This seed, which was selected because of being clean and free from wild oats and other noxious impurities, was carefully recleaned and sold at a price sufficient to cover the net cost of the recleaned seed. Special freight rates and arrangements for handling were provided by the railway companies. The provincial Departments of Agriculture for Manitoba and Saskatchewan extended their hearty co-operation by providing the municipal governing bodies with financial assistance to enable them to purchase seed for needy farmers. Seed grain in any quantity was shipped either in sacks or in bulk to fill orders received from individual farmers, farmers' organizations, municipal governing bodies, or seed merchants, in any part of Canada. One hundred and fifty-four thousand bushels of seed oats and a small quantity of seed wheat were shipped on orders from points in Ontario, Quebec, and New Brunswick.

All orders were filled subject to cash payment by bank draft, and the moneys as collected were deposited to the credit of the Receiver General. A total of one million, four hundred thousand dollars was placed to the joint credit of the Chief Commissioner and the Accountant in Regina in installments of one hundred thousand dollars as required. The total amount returned to the Receiver General up to the 31st of September, 1917, was one million, four hundred and twenty-two thousand dollars, in addition to which there is in the Canadian Government elevator at Moose Jaw about twenty-four thousand bushels of seed oats, which were held in reserve and will be needed in Saskatchewan for next spring's seeding.

The volume of work entailed in handling seed grain of this amount, which has to be procured by picking out special cars of superior quality can be fully appreciated only by men who have had wide experience in this kind of business. All of this work, however, was managed throughout by the members of the Seed Branch staff who served on the Commission and who had had several years' experience in the work of seed inspection. That the seed sold and distributed was generally satisfactory would seem evident from the fact that no serious complaints and many letters of commendation have been received.

The Commission is now purchasing seed oats in quantity for next year's supplies to meet the needs of northern areas in Saskatchewan, Manitoba, Ontario, Quebec and New Brunswick. In addition they will procure sufficient supplies of high quality Marquis seed wheat, grown from registered seed, to meet the needs of those farmers who may desire to procure a supply of fresh seed of superior quality. All orders for seed grain desired from this Commission should be addressed to Seed Purchasing Commission, Post Office Building, Regina, Sask.

THE LIVE STOCK BRANCH

A BACON PRODUCTION CAMPAIGN

FOLLOWING instructions from the Houourable T. A. Crerar, Minister of Agriculture, a meeting was called by the Acting Live Stock Commissioner, Mr. H. S. Arkell, in Ottawa, on October 26th, of representatives of the Departments of Agriculture in the provinces of Ontario, Quebec, New Brunswick, Nova Scotia and Prince Edward Island, and of delegates from the different swine-breeding associations, for the launching of a Bacon Production Campaign. The Food Controller, Hon W. . Hanna, and the principal members of his staff, attended and furnished much information regarding the situation.

After the opening address of Mr. Arkell, who presided, Mr. Hanna made an impressive speech pointing out the serious state of the world's affairs, particularly so far as regards hog products. He referred to representations that had been received from France and other belligerent nations relating to the urgency of their needs and said that it was known that the swine-herds of Europe had been decreased since the war commenced by 32,425,000 head. Even if the Allies were to kill the greater proportion of their hogs they could not meet their own demands. Even in the United States the production could not be much more than would meet the requirements of the home market. As long as the war lasts the decrease in Europe must continue to develop. Thus a profitable market for all Canada can produce is assured for years after the war. The matter had been taken up with the Hon. T. A. Crerar, Minister of Agriculture, and he had given the movement for the greater production of swine his hearty endorsement and had put the Live Stock Branch of his Department at the service of the work. The meeting was held to enlist all the forces of the Dominion in the same direction.

Lengthy discussion followed Mr. Hanna's remarks, a deal of valuable information and counsel being given and the following resolutions adopted:

Moved by Mr. J. E. Brethour, seconded by Professor G. E. Day:

That this meeting having the assurance of the Minister of Agriculture and the Food Controller that they will regulate the spread between the producer and the consumer, we, the representatives of the Hog-Breeding Industry, approve of the movement to increase hog production and proceed to consider ways and means.

Moved by Mr. J. E. Brethour, seconded by Mr. E. S. Archibald:

That the Department of Agriculture, acting in co-operation with the Food Controller's Department be requested to make the best arrangements possible to make available to farmers and feeders of live stock all available wheat screenings of high grade, and also make the necessary arrangements to properly control the manufacture and sale of bran, shorts and middlings, and prohibit the use of weed seeds and other injurious material as adulterants in the manufacture of the same.

Moved by Mr. M. Cummings, (Secretary for Agriculture, Nova Scotia), seconded by Mr. J. E. Brethour:

That the Live Stock Division be asked to prepare a brief *resumé* of the facts presented at this meeting and the deliberations with a view to presenting before the farmers as soon as possible the actual situation and so to stimulate them into hog production, and that after this is prepared, it be circulated in a somewhat similar way to that in which the bulletins of the Department are circulated.

Committees on different branches of the work needed were appointed who at once entered upon consideration of the details.

Following the foregoing recorded gathering of representatives from the eastern provinces to consider the question of increased production of swine products, a meeting of similar representatives from the western provinces, was arranged to be held also in Ottawa, on November 7th.

PART II
Provincial Departments of Agriculture

FARM LOANS AND LAND SETTLEMENT

NOVA SCOTIA

BY ARTHUR S. BARNSTEAD, SECRETARY OF INDUSTRIES AND IMMIGRATION

THE Land Settlement Act of Nova Scotia says that whenever a loan company will agree, upon receiving the guarantee mentioned, to advance to a farmer on mortgage on farm lands and buildings an amount not exceeding 80 per cent of the value of such farm lands and buildings, then the Lieutenant-Governor-in-council may give a guarantee in writing, to such loan company against loss on any such mortgage taken to an amount not exceeding the difference between 40 per cent of such appraised value and the amount of the loan.

Under this Act there has been 155 applications for loans. Of these applications 57 have been accepted. The amount of loans applied for totals $279,735. The amount of loans granted totals $112,305.

The funds granted are utilized largely in purchasing stock and implements, and in some cases in the purchase of farm properties.

NEW BRUNSWICK

BY W. R. REEK, B.S.A., SECRETARY FOR AGRICULTURE

NEW Brunswick, in common with the other Maritime provinces, has seen her rural communities gradually depleted by the inducements offered in large cities or the newer parts of the great West, and as a result many homesteads gradually become over-run with weeds, the buildings racked and desolation in possession where once a family existed, with plenty, though perhaps not in great wealth. She has also seen many who have remained grow wealthier, with a result that the farms are in excellent condition, the farmer satisfied and a demand from many without money, but who were willing to work for a chance to make their homes in New Brunswick because they, too, had faith in the latent possibilities which were awaiting development.

Capital was required. The Government in 1912 passed "An Act to Encourage the Settlement of Farm Lands." Under this a "Farm Settlement Board" was constituted, consisting of three members, a body politic and corporate. They have the power to purchase, hold and possess, within the province, real estate suitable for general farming purposes, to improve and erect houses and buildings where necessary. They may also buy and sell personal property in connection with real

estate being bought and sold.

Farms are purchased and sold to settlers at cost. If the purchase price is less than $1000 the initial payment is to be 25% of the purchase price, but if more than $1000 then an initial payment of 35% is demanded. The balance with interest at 5% is to be paid at a time not exceeding ten years from the date of the agreement. Under special cases an extension of two years may be granted.

Approximately 332 farms have been purchased and with a few exceptions these have been sold. Many were taken by residents of the province and several by men coming from other parts. The deeds are held by the Board until all payments are settled. The initial payment is small and terms are sufficiently easy in order to allow young men of character to obtain a start, thus helping them in the province, whereas they would have otherwise left and many would have drifted out of Canada.

It is true that it does not meet every condition which might be met under a system of Rural Credits, but it alleviates the difficulties facing many, and in conjunction with such a system provides for every worthy applicant.

QUEBEC

BY J. ANTONIO GRENIER, DEPUTY MINISTER OF AGRICULTURE

THERE is no system of agricultural credit in the province of Quebec, at least no system such as has been established under special laws in other provinces.

There is, however, in our statutes a law under which farmers may establish co-operative banks or rural institutions of credit (*caisses rurales*). This is the Law of the Quebec syndicates. These "caisses," founded by Mr. Alphonse Desjardins, under the patronage of the late Earl Grey, then Governor-general of Canada, who was one of the shareholders of the "Caisse populaire de Lévis," have greatly increased in number in this province and some of them are very helpful to farmers and workingmen.

These banks, however, only dispose of the funds that are entrusted to them by their members. No money is loaned by the Government. It is not, therefore, agricultural credit, properly speaking.

The Minister of Agriculture is not authorized by law to lend money directly to farmers. He may, however, make loans to agricultural associations, farmers' clubs, co-operative associations, breeding syndicates or other agricultural associations for the purchase of registered breeding animals or any other purpose in connection with the improvement of agriculture. Such authorization was given to him by the Legislature in 1910 under 1 Geo V., ch. 13. The following amounts have been loaned to our various associations during the last three years:—

	1914–15	1915–16	1916–17
Agricultural associations	$ 2,736.00	$ 8,752.00	$ 7,249.00
Farmers' Clubs	9,911.70	12,366.44	16,741.37
Breeding syndicates	9,900.00		
Various associations	19,788.24	22,942.00	18,773.00
Totals	$42,335.94	$44,060.44	$42,763.37

All these moneys were loaned without interest and are repaid by means of annual instalments. Almost the whole of the amount was spent on the purchase of breeding animals. Some fifty clover threshers were purchased out of this money in the last two or three years by various farmers' clubs and agricultural associations.

NOTE.—The co-operative banks (Caisses Rurales) referred to by Mr. Grenier were described in THE AGRICULTURAL GAZETTE for May 1914. As was pointed out their operations are not confined to rural districts, but have been established as well in labouring district of urban centres; mining districts and in newly settled sections. The Statistical Year Book of Quebec for 1916 shows the amount of business transacted by all of these banks from their organization up to the end of 1915. Reports from three of the smaller banks were not available. The amount of business done is shown in the following tables:

RECEIPTS

Capital Stock	$ 932,134.06
Savings	9,235,201.12
Remitted on loans	5,207,284.11
Levied on receipts and profits	353,304.26
Total	$15,727,923.55

PAYMENTS

Capital withdrawn	$ 209,081.97
Savings withdrawn	8,089,107.58
Loans	6,905,414.16
Interest on savings	63,551.40
Dividends	88,562.26
General expenses	45,753.31
In hand	326,452.87
Total	$15,727,923.55

SASKATCHEWAN

BY F. H. AULD, DEPUTY MINISTER OF AGRICULTURE

SASKATCHEWAN'S Farm Loans Act became law on May 1, 1917, but in view of the approach of the provincial elections the Government announced that no applications for loans could be accepted until the elections had been held. The election date was June 26th. Since that date the Farm Loan Board has been open for business and the farmers of Saskatchewan have apparently been mindful of the fact for during July and August they applied for loans to the number of 1,124 and to the value of $2,259,015.

The Saskatchewan Farm Loans Act is a clear cut business statute and specifies the uses to which loans may be put,—namely, permanent improvements, productive purposes, the payment of liabilities previously incurred for such purposes, or in special cases the purchase of land. Live stock is not specially referred to in the Act, but several borrowers are seeking money to enable them to buy cattle. The Saskatchewan Live Stock Purchase and Sale Act under which a third of a million dollars' worth of stock has been sold to Saskatchewan farmers on credit terms makes special provision for granting credit in the form of cattle, sheep and swine.

All loans under the Farm Loans Act are to be for 30 years and are to be made at cost. Repayment will be on the amortization plan so that the borrower has the same amount to pay each year. He may pay more than the sum due, but the usual amount will be due the following year, any excess being applied to the final payments. It is expected that the annual payments covering both principal and interest will be less than most borrowers in Saskatchewan are now paying in interest alone.

A PROVINCIAL LOAN

For the purpose of meeting the financial requirements of the Act, the Provincial Government has decided upon offering a bond issue to the people of the province to be known as the Saskatchewan Greater Production Loan. The bonds are to be issued in denominations of $20, $100, $500 and $1000, bearing interest at 5 per cent per annum, payable half yearly, and to be redeemable at par at any time on giving three months' notice to the Provincial Treasurer.

BRITISH COLUMBIA

BY MAXWELL SMITH, CHAIRMAN, LAND SETTLEMENT BOARD

THE Land Settlement and Development Act, passed at the last session of the Legislature, was designed with the object of benefiting every citizen of the province by facilitating increased agricultural production.

The administration of the Act is entrusted to what is known as the Land Settlement Board consisting of the chairman and five directors.

While the loaning of money to farmers for development purposes, chiefly to increase production, will continue to be an important feature of the Board's work, the public development and settlement operations, provided for in the Act, will doubtless be the most far-reaching from a financial and educational point of view, as there are many areas of unoccupied fertile lands within the province where the Board may undertake extensive clearing, draining, dyking, irrigation and reclamation schemes, thereby helping solve many of the difficulties with which the farmer is confronted.

It should be borne in mind that the Board is not entering the competitive, but rather the co-operative field, as it is the intention that both the loaning and development features of the Board's work shall be made self-sustaining and conducted on sound business principles.

We realize that our first duty is to create conditions that will facilitate the profitable occupation of the land, making it possible for the farmer to earn a fair living under congenial circumstances. Then there will be no need to worry about getting people to occupy and cultivate the soil.

In "The Land Settlement and Development Act "a good start has been made along practical lines, as the Board is empowered to undertake important land development work that should revolutionize the agricultural status of the province.

The establishment of demonstration areas in different parts of the province, having a diversity of climate and soil conditions, will not only facilitate rapid and permanent settlement on these areas, but all the information thereby obtained, as to the best and most economical methods of clearing, dyking, draining, irrigation, cultivation, etc., with accurate figures as to cost and possibilities of revenue, will be available for the benefit of private enterprise.

We should not be satisfied with the agricultural conditions of British Columbia until she is producing her own consumption of necessary foodstuffs and has begun to export a sufficient surplus of what we can grow ourselves to purchase the luxuries we are compelled to import from other countries.

While more or less paternal, the Land Settlement Board is not a benevolent institution. Its operations must be conducted on sound business principles. It is proposed to make the demonstration development schemes sufficiently revenue-producing to re-imburse the Government for the expenditure, while at the same time facilitating settlement under reasonable advantageous conditions.

The loaning department must also be conducted on a self-sustaining basis. Loans are made on first mortgage securities for agricultural purposes. It must not be overlooked that there are difficulties confronting the Board in these abnormal times, in regard to the question of obtaining the necessary funds with which to operate during the present unsettled state of the money market.

QUEBEC

AGRICULTURAL WORK AT THE QUEBEC MILITARY HOSPITAL

BY A. DESILETS, B.S.A. DISTRICT REPRESENTATIVE

WITH the authorization of Mr. J. H. Sexton, Vacation Officer, Major J. D. Pagé, chief of the Military Convalescent Home of Sans-Bruit, Quebec, has made arrangement for teaching agriculture to convalescent soldiers. The courses are in charge of the writer. The programme includes the following:—

(a) Drainage survey and rotations-practical work on the hospital farm. Five acres were drained by the farmer and soldiers under the direction of the instructor in the fall of 1916.

(b) Lessons in commercial poultry keeping.—Selection of Rhode Island and Wyandotte stock, artificial incubation, feeding, grading of eggs, castration, fattening and slaughtering, all these are practised under the supervision of the instructor. Several soldiers have made a start in poultry keeping since leaving the home.

(c) Market gardening, prepared by class work, has been conducted on a small area, which will be twice as large next year. Model hotbeds are prepared and sown by the soldiers themselves, who also cultivate a co-operative garden, with the help of the farmer. In the spring of 1918, the soldiers will grow individual plots, the products of which will be sold for their own profit.

(d) Two bee-hives were placed at the disposal of the class, and the work was done in the presence and with the help of the pupils.

Some of the convalescents also help in field husbandry, the preparation of the soil, ploughing, harvesting, etc., and the care of the lawn and flowers.

In July, the professor and the pupils visited the Cap-Rouge agricultural station, where they saw the herds, the buildings and the experimental plots. Automobiles had been placed at the disposal of the excursionists by Mr. M. T. Ross.

A second visit was paid to the various departments of the provincial fair of Quebec. The pupils were taken by the instructor to the cattle, agricultural implements, horticultural and poultry exhibits. This visit lasted five hours and the students were greatly interested.

THE ROYAL AGRICULTURAL SCHOOLS

THE Royal Agricultural Schools, incorporated by the Legislature of Quebec, are designed to give instruction to the sons of soldiers.

Schools and farms are situated in the township of Howard, county of Argenteuil, province of Quebec.

These are open to sons of soldiers of all nationalities or religions who have taken part in the war.

The property of the schools consists of 3,468 acres, of which 1,718 acres are freehold and 1,750 acres are held under license from the Province of Quebec. There is on the property a large stone sawmill with metal roof, a large residential building to accommodate twenty-five boys, a residence for teachers and a number of cottages for workmen. The school will be opened imme-

diately with twenty-five boys but as this is only a small percentage of the number which should be provided, the directors now appeal to the public for a sum sufficient to provide buildings and equipment for at least one hundred. This will cost about fifty thousand dollars.

The schools have been incorporated and the business will be conducted by a board of directors. A board of governors will have general supervision over the schools. A number of gentlemen have already accepted positions of governors and others will be added from contributors to the funds of the schools.

The directors will be in close touch with the Military Hospitals Commission, the Canadian Patriotic Fund, the Soldiers' Wives League and other associations interested in the welfare of soldiers and their families.

Boys of all nationalities and religions will be accepted. They must be in good health and of good character. No vicious boys will be admitted or retained. The parents of boys will be under no expense for their sons, while these are at the schools. When of sufficient age, the boys will be assisted in making a start for themselves.

HOW TO REGENERATE AGRICULTURE

BY J. H. LAVOIE, CHIEF OF THE HORTICULTURAL DIVISION

AN upsetting of equilibrium between urban and rural populations threatening seriously our economical future, has occurred in this country when industry became the direct antagonist of agriculture, and the only way in which this danger can be prevented is to hasten the development of agriculture.

The chief cause of this decline of agriculture lies in the fact that man constantly seeks to improve his comfort; therefore the equilibrium in favour of agriculture can only be restored when this industry has become sufficiently progressive and renumerative to give agricultural workers a degree of comfort at least equivalent, if not superior, to that which they may find in cities and sufficiently attractive to counterbalance urban attractions.

Was there ever such an opportune time as the present to hasten the development of agriculture, when a shortage of food, felt in the most productive countries, exerts on our agriculture an international action of sufficient strength to free it from its shackles and determine the growth of our economic life?

Was it ever more urgent to stop the rural exodus than at this hour, when our urban populations are so uneasy over the excessive cost of food and bewail the lamentable consequences of the desertion from the land?

For all these reasons, and because it is recognized that agricultural progress is necessarily slow, it is important that our Governments should urgently take the necessary steps to spread agricultural teaching in all its forms.

The Quebec Department of Agriculture is not shirking its duty in this respect. Provision will be made for the scientific and technical development of agriculture by teaching the best methods and processes, by all the means at our disposal.

As it is well known, on the one hand, "that any social action must originate with the family" and that, on the other hand, agriculture cannot be made progressive and remunerative unless the farmer has the full cooperation of his children, the department has been endeavouring, for the last few years, to attach the rural youth to the soil by giving it an agricultural training.

To be of lasting effect, this agri-

cultural training should be given in the early youth, hence the reason why the Department has encouraged the creation of school gardens and the establishment of young women clubs.

Messrs. J. Chs. Magnan, B.S.A., superintendent of the school gardens, and Alphonse Désilets, B.S.A., director of the young women's clubs have often had the opportunity of explaining to the readers of THE AGRICULTURAL GAZETTE the direction given to each of these movements of agricultural regeneration and to supply valuable indications on the results so far obtained.



AGRICULTURAL MUSEUM OF SAINT CASIMIR COLLEGE, P.Q.

This school museum includes: a collection of economic plants and grains; samples of soils; sample bottles, test tubes, instruments for practical demonstrations; agricultural miniatures, an egg tester, farm animals in celluloid, a spring scale, explanatory tables, comb and extracted honey, acids, drains, a small hive and a miniature silo, etc., etc.

To complete this information, I shall describe the two chief means by which we are endeavouring to encourage emulation among the children, to stimulate their interest and therefore assure the success of our work. I should mention in the first place the establishment of a provincial nursery, which is to give bonuses to school gardeners during the school fairs; secondly, the teaching of methods for the conservation of fruit.

prizes at the school fairs, held in districts where a District Representative or an instructor resides. The number of trees distributed to each school gardener will vary according to the species and the particular needs of each district. It will not exceed four fruit trees for this year. These trees will be planted around the home, in a place chosen by the instructor during his visit at the home gardens, and in accordance



FRUIT NURSERY OF THE DEPARTMENT OF AGRICULTURE AT BERTHIERVILLE, QUE.

I. NURSERY OF THE QUEBEC DEPARTMENT OF AGRICULTURE

This nursery established at Berthierville in 1914 covers an area of about ten acres, and now contains several thousands fruit trees and shrubs, and ornamental trees and shrubs of acclimatized varieties, a free distribution of which is being made to the children gardeners winning the first, second and third

with the instruction and the demonstrations given by him at the school in presence of all the pupils.

In the near future, sufficient trees and shrubs will be available from this nursery to make ornamental plantations on school grounds. The school grounds selected for the purpose will be those of the district having the best school garden, according to the representative or instructor.

It is believed that this plan may induce a love for trees and flowers on the farm, and promote fruit culture.

II.—TEACHING METHODS OF FRUIT CONSERVATION

Realizing the importance of this industry in domestic economy, the Department decided last year to organize a special division of the Horticultural Branch, to work towards its extension and improvement.

On his return from a mission to the United States, Mr. Grise, B.S.A., officer in charge of this section prepared a programme, the main parts of which are as follows:—

1.—Educational campaign in favour of a greater production of small fruits and vegetables.

During the lectures given on this subject, a special endeavour was made to encourage the farmers of a district to grow the same varieties.

2.—Free distribution of seeds of vegetables to young women's clubs.

3.—Educational campaign on the best methods of conservation of horticultural products, with demonstrations. The lecturer makes a free distribution of all literature published by the Department on this subject and gives demonstrations on canning, making of jellies, with the equipment that he has for the purpose. This equipment includes some of the machines that are the most commonly used on this continent as well as various models of sealed containers, etc.

Practical demonstrations are given at the short courses on domestic science, district or school horticultural fairs, including the centres where horticultural societies and young women's clubs are found.

5.—Special advantages given to members of various horticultural societies in the purchase of materials required.

6.—Organizing of competitions, distribution of prizes to the most worthy competitors.

There has been such a number of requests for information and demonstration that our staff has been unable to meet the demands and it has not been judged advisable therefore to advertise by means of posters.

The development which this domestic industry appears to be taking in this province gives us the hope that it will cause a large number of agricultural vocations to be taken up by the women folk of the rural population.

ONTARIO

A RURAL SOCIAL AND BUSINESS SURVEY IN PEEL COUNTY

BY JUSTUS MILLER, B.S.A., ASSISTANT COMMISSIONER OF AGRICULTURE

COMPREHENSIVE agricultural surveys are to be conducted in the province of Ontario. The first of these is at present under way, and has taken the form of a complete business and social survey of the representative township of Caledon in Peel County. It is hoped in this township to get at the root of the rural problem; to discover to what extent farming is a profitable business; to secure definite proof whether farm life, having regard to all the controlling factors, is favourable to the development of contentment, enthusiasm and the highest type of citizenship, and whether the farmer has confidence in his business to develop it to the logical limit; to ascertain the viewpoint of the farmer and his family toward the farm and farm life; to get at the heart of the financial, business and economic factors which govern

his business; to study farm methods as practised; to consider the home the school, the church, organized bodies and the community spirit in their relation to the efficiency, happiness, social conditions and welfare of the people.

When this information has been secured, completely analyzed and made scientifically accurate, yet practically applicable, the deductions will be presented to the people of the township, to see whether it be satisfactory or otherwise, and with their co-operation to formulate a clear and progressive policy for the future. The general results of the survey will be presented to the public in bulletin form as representative of that section of the province in which Caledon Township is situated.

As a very great deal of work is involved in such a complete survey the assistance of several officials in the provincial service who are particularly interested in, and who had made a study of rural surveys, was enlisted. Mr. A. Leitch of the Ontario Agricultural College, who had charge of the rural surveys in the province, is general supervisor, while Mr. J. W. Stark, District Representative for Peel County, Mr. Alex. MacLaren, lecturer in Rural Sociology at the Ontario Agricultural College, and the Assistant Commissioner of Agriculture are personally directing the different phases of the work.

In order to secure the co-operation and sympathy of the people of the township for the project and their active co-operation during every stage while the survey was being conducted, in formulating a progressive policy of improvement when results were analyzed, and after that in putting it into effect, the township council were asked by the District Representative to express their view in the matter. They promptly indorsed the proposal in a resolution sent to Dr. G. C. Creelman, Commissioner of Agriculture for Ontario, tendered their services as an advisory committee, and offered to assist as individuals at any time and in any way required.

A resolution was passed endorsing the project and recommending that a meeting of representatives of all the various organizations of the township be called to discuss details of organization and general plans. The council also called two meetings at different points in the township, inviting rural leaders, ministers, teachers, business men and representatives of all organized bodies in the township for the purpose of discussing the survey in detail. Very representative gatherings occurred despite the bad weather which prevailed during early June, and the matter was well threshed out. At each meeting there was passed a unanimous resolution endorsing the action of the council and tendering the assistance of all present in the furtherance of the work.

The survey consists of six schedules. One concerns the school and is located by the teachers, and a second by the secretaries of trustee boards. One analyzing religious and church affairs is handled by the ministers. The fourth treats all organized bodies (apart from religious organizations), and is in charge of the officers of these bodies. The fifth is a community survey, and is made by the District Representative in co-operation with other officials. The last consists of a comprehensive questionnaire to be answered by every farmer in the township.

Already the school and church schedules have been completed. The community and organization census is at present under way. The farmers' questionnaire will be taken to every home by personal visit in the fall, as soon as the season's crops are disposed of, probably beginning early in October. Shortly before that time a survey sermon will be delivered from every pulpit, on a fixed date, while a letter will be sent to each farmer by the township council asking his sympathy and support

in the work. From the beginning the local county press has taken an interest in the work, has published explanations regarding the survey, and reports of the meetings, and in a most commendable way has helped to make public and popularize the project.

A large map of the township was prepared showing the locations of all lines of communication, villages, schools, churches and farms. With the information given on this map one may find at a moment's notice the name of each farmer, the exact location of his farm and how best to reach it and the number of acres it comprises. Each school section—the unit of survey—is also shown. From the original a number of blue prints have been taken to be used in connection with the various schedules as hereinafter explained.

Filling the farmers' questionnaire is by far the hardest problem of all, as can be readily understood when it is considered that there are approximately 600 farmers in the township and something over 1000 sections in the questionnaire. To prevent taking up too much of the farmers' time two divisions are made. The first contains those questions which it will be necessary to ask each individual—about one quarter of the entire number on the questionnaire. The second comprises the whole list and will be asked of 100 farmers. So far as is practical, arrangements will be made ahead of time to visit these latter at night. No distinction, of course, will be made in the selection of these 100 farmers, as it will be necessary to get men representative of all degrees of prosperity, and the reverse, so that the sum total will be truly representative of the whole township. It is expected three men will be able to visit all the 600 farmers in this way and fill out the questionnaire in not more than two months.

The questions asked of all the farmers are grouped under the following heads:

Tenure.—The purpose is to discover just how the land is held, whether tenantry is on the increase or decrease and the consequent effect upon agricultural and social conditions.

Home and Family.—In this division a survey is made of the family and family life, the nationality, how many members have left the farm and why, school and church attendance and the membership the family represents in organized bodies in the community; a complete resumé of working and living conditions in the home and labour saving conveniences; the attitude of the family toward farm life; arrangements regarding family partnership in the business affairs of the farm.

Farm Plan.—Here is considered the lay-out of the farm regarding acreage and crops, improvements, etc.

Live Stock.—A complete account of live stock holdings regarding numbers, quality and management is requested.

Farm Methods.—This division considers the seed grain, varieties and mixtures sown, manure and commercial fertilizers used, rotation of crops, cultural methods in fields and orchards, methods of feeding and general principles and practices of farm management.

The hundred farmers who will be selected to reply to the complete questionnaire will be asked all the foregoing together with the following:

Farm Equipment.—This division includes buildings and equipment, implements of all kinds and the care given. An endeavour will be made to discover to what extent over, and under, equipment in these exist, and the consequent influence upon profits.

Rural Economics.—This is perhaps the most difficult section of all. It seeks to discover the total capital represented by each farm in land, stock and equipment, labour expended both by family and hired help, the productive labour of women on the farm apart from household duties, the receipts from all departments of the farm and from outside

business, the expenditures for business and personal reasons and finally the labour income.

Roads and Transportation. Organization and co-operation. Education, academic and practical. The church and church life. Social conditions, and health and safety, are the other divisions, each of which is treated very thoroughly, yet is summarized sufficiently to prevent the farmers' patience from being over-taxed.

The school schedule treats of equipment, attendance, the teacher, curriculum, school activities, aside from curriculum, school as social centre and its community relationships, medical inspection of children, total expenses and total township expenses at present as compared with those of a consolidated school; while the church schedule considers organization, equipment and finances, membership and meetings, the Sunday School, young people and the farm, religious organizations, recreations and amusements provided by the church, church growth and the minister. Each teacher, secretary of school board and minister in the township was visited personally and the schedule filled out at the time.

The rural organizations census calls for the name in each case, the purpose of the organization, the value of equipment, amount of annual expenses, list of members, its progress, the essential features of the rules and by-laws and methods of organization. Maps will be prepared showing the various headquarters, while the members will be connected with them by lines. It will show graphically how unevenly, in many cases, the membership of even the most important agricultural societies are located.

In the general community survey to be compiled by the District Representative and his colleagues, such matters will be treated as: the total acreage of the township, the acreage of arable, untillable and undrained land, the average investment per farm compared with the least and most successful farms, funds spent in general labour, market, financial and economic conditions, etc.

When the analysis is completed striking diagrams will be drawn and maps prepared showing organizations, membership, school and church attendance, etc. Then a series of meetings will be instituted in every school section. Local leaders who have proven most enthusiastic in the work will be consulted and all the people will be invited to attend. While each individual's business will be considered as absolutely confidential, general conditions in the community will be discussed and the farm methods and management of the most successful farmers used as evidence. Conditions, good and bad, will be shown in sharp relief and a programme of suggested improvement drawn up. With actual facts as a basis, it is expected that important and lasting results will follow, both for the community and for Canada.

INCREASE IN HOG PRODUCTION—A PRACTICAL PROPOSITION

UNDER instruction from the Minister of Agriculture for Ontario, a scheme has been put into motion for the encouragement of hog production that has a practical ring. The endless chain method has been adopted. In the first instance a memorandum was addressed to every District Representative in the province, asking for a report on the hog situation in their respective domains. Forty per cent of the answers were to the effect that hog production had increased, thirty-five per cent reported a normal condition, the remaining twenty-five per cent reported a decrease, giving as the reasons for this the high price of feed, the scarcity of labour and the cost of milk, con-

sequent upon the demand by condensing factories and in urban centres The next move was to invite each Representative with three leading farmers in each county to attend a conference in Toronto on November the 6th. On that day from 160 to 175 District Representatives and representative farmers were present to hear an address from Hon. W. J. Hanna, Food Controller, and other testimony as to the seriousness of the situation, not alone in Europe but in the whole world. The delegates to this meeting were asked to go back to their homes and to arrange a conference in each county, to be held on November 16th, of two active members from each Farmers' Institutes and other agricultural societies. Those who attended the meeting in Toronto would convey the information they received at first hand to their representative fellow-farmers of the county. These again were to be asked to return to their respective townships and to call meetings at different points, of the farmers in the neighbourhood to the extent of two representatives of the localities in every instance. Those present at these township meetings, in turn, were requested to travel along the concession lines and to inform every separate farmer of the evidence they had of the necessities of the situation. Thus every farmer in the province would be reached. From all these conferences typewritten reports are expected of exact details of what the farmers propose to do, as well as of the general situation in the locality involved in every instance. The Assistant Deputy Minister of Agriculture for the province, Mr. C. F. Bailey, to whom the direction of the scheme has largely been entrusted, in furnishing the details, also announced that the 190 brood sows at present on the Government farms in the province would be increased to 600 as an example of the definite earnestness of the Provincial Government to do their share towards the increase of hog production. It is also proposed to endeavour to have village and township regulations so changed as to allow villagers to keep pigs. A further provision is an arrangement whereby the garbage, suitable for feeding, from military camps, hotels, restaurants and private houses, will be conserved and distributed for that purpose.

PREMIUMS FOR STALLIONS

BY R. W. WADE, SECRETARY, STALLION ENROLMENT BOARD

THE Ontario Department of Agriculture, wishing to encourage the keeping in the province of stallions of the highest type, have instituted a premium system. Only horses having, or eligible to receive, the highest of the four forms of certificate, issued under the Stallion Enrolment Act, shall be entitled to participate in the premium system. All horses coming in this class shall be entitled to receive a special inspection by a select committee of horsemen called the Premium Inspection Board. Inspection by this Board has been made at the Canadian National Exhibition, Toronto, Western Fair, London, and Central Canada Exhibition held at Ottawa. Provision has been made for further inspection at the Guelph and Ottawa Winter Fairs this coming winter.

Horses found by the Premium Inspection Board to be sound, of superior conformation, character and type, shall be entitled, on being enrolled, to receive a certificate which will entitle the owner to a premium according to the number of foals sired in the premium year as follows:—

(a) From 35 to 59 foals..... $50
(b) From 60 foals and upwards.... $100

The first premium certificates will be awarded for 1918.

EXPERIMENTS WITH LIME

BY ROBERT HARCOURT, B.S.A., PROFESSOR OF CHEMISTRY

IN connection with our soil survey work, we have been carrying on a number of lime experiments particularly upon heavy clays. Similar experiments are carried on on muck soil and others of like nature. So far as is practicable we secure the co-operation of the District Representatives. One of these experiments has been going on in Welland county for two years under the immediate supervision of Mr. E. K. Hampson, B.S.A., District Representative. The plan of this particular experiment is as follows:—

No. of Plot.	Fertilizer Applied	Rate acre tons
451	No lime	
452	Ground limestone	2
453	Ground limestone	5
454	No lime	
455	Ground limestone	5
456	Ground limestone	10
457	No lime	
458	Ground limestone	10
459	Ground limestone	15
460	No lime	
461	Ground limestone	20
462	No lime	
463	Fresh lime	2
464	Fresh lime	4
465	No lime	
466	Fresh lime	4
467	Fresh lime	6
468	No lime	
469	Gypsum	1300 lb.
470	Gypsum	1 ton

Mr. Hampson, in reporting upon this experiment for this year, gives the following deductions:—

(1) Ground lime-stone in every case showed an increased yield.

(2) That the clover on the lime plots was much more luxuriant than on the unlimed plots, which seemed to have a preponderance of blue-grass. On this account the weights obtained are not an exact index to the value of the lime as blue-grass weighs very heavily.

(3) That Gypsum gave an increased crop of hay over the check plots, but that it cost much more than the ground lime-stone, and was not any more efficient.

(4) That the slaked lime showed good results where the clover was not killed out. Unfortunately the slaked lime was applied in the spring to the young clover crop, and some of it was killed, but where the clover survived, the plants were all strong and showed a marked improvement on the unlimed plots.

(5) Moderate applications of lime, five tons per acre gave practically the same results as plots having larger applications. As there was over a ton of hay on the plots we had considerable trouble in getting the results of this experiment, but they should be of great value to the district surrounding Stevensville.

FRUITS FOR MILITARY HOSPITALS

CONTINUING the policy of last year, the Ontario Department of Agriculture will supply canned and preserved fruit to the overseas military hospitals this year. In response to an appeal from the Ontario Agent-General in London, England, the Department has undertaken to prepare and send two million pounds of canned fruits and jams. Of this quantity some eight hundred thousand pounds will be put up at the Vineland Experimental Station in the small experimental cannery. The package exclusively used is the gallon sanitary can which requires no solder for the cap. This can makes an ideal size for hospital use. Already the following quantities have been put up and are awaiting shipment:—

Strawberry Jam	3,900 gals.
Raspberry Jam	3,350 "
Black Currant Jam	2,250 "
Blackberry Jam	2,200 "
Canned Sour Cherries	2,250 "
Other Canned Fruits	250 "
Jellies	325 "

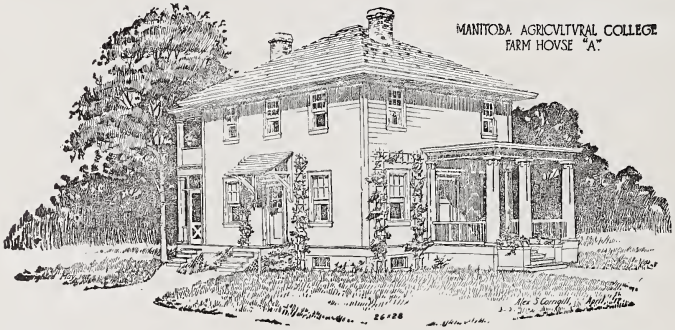
The heaviest part of the pack will be, as in 1916, canned peaches with a considerable quantity of plums and pears. The factory has been running night and day on these fruits, the season for which being considerably later than last year.

MANITOBA

BETTER FARM HOMES

BY L. J. SMITH, B.S., PROFESSOR AGRICULTURAL ENGINEERING

THE Manitoba Agricultural College, through the Agricultural Engineering Department, is contributing a service calculated to improve the homes of the farmers of Manitoba. In the summer of 1916 the college in co-operation with the Department of Agriculture inaugurated a better farm home competition open to the farm women of the province. As a result of this competition sixty-three plans were submitted and of these, five were selected by the judges as being worthy of prizes. Each of the five contributors was awarded $25 in value, in the form of cutlery or silver ware. These plans are being used as a basis for the service now being inaugurated. The plans are being redrawn by capable draughtsmen under the direction of the Agricultural Engineering Department, which also prepares a complete bill of material and a set of specifications for each plan. These are being made available to residents of the province at a nominal fee, and for those outside of the province a slightly larger fee is required. The agricultural papers are publishing the floor plans and exterior view of each prize plan. When all have been published in this manner they will be distributed in bulletin form together with other information on farm houses.



THE USE OF THE FARM TRACTOR

BY L. J. SMITH, DEPARTMENT OF AGRICULTURAL ENGINEERING, AGRICULTURAL COLLEGE

THE Manitoba Agricultural College purchased a 10-20 kerosene outfit this spring for use on the farm, and it has given very good satisfaction. We started with an operator who had had practically no experience with a gas engine, and while he was a very good man, he was held up quite often because of the small points in the operation of the tractor that he did not quite understand.

Our experience here, and in connection with our college work, in traction engineering, has been that it is almost absolute folly for a man to expect to get satisfaction out of the gas tractor, and especially in a kerosene tractor, if he has had no previous experience with gas engines. If one has operated an automobile, or a small stationary engine, for some time, long enough to come up against some of the ordinary troubles, he will find that this experience will be of considerable value; but, if I were a farmer, I would not think of purchasing a tractor without first taking a short course in traction engineering. The time and money spent on such a course will come back probably seven times in the first season's run of the tractor. Then, too, if the operator does not understand the ordinary necessary details in the up-keep of the gas tractor, his machine will lose from one-third to one-half its power before the season is half gone, and the fuel economy of the engine will also be cut down very much.

From either standpoint, therefore, I would advise no farmer to buy a gas tractor without first having taken a course in gas traction engineering. These courses can be had from agricultural colleges, and from the various traction firms themselves. Quite a number of prospective buyers visit the factory and spend a month or so in becoming familiar with the engine where it is being built. This is a very good idea, and should be followed by more prospective buyers.

Thus far, we have no data in regard to the amount of work done, or the fuel consumption from our tractor. I do not consider such data of as much value if taken during the first year of the tractor's use when it is new and all the parts in fairly good condition, as if the data were taken during the second year, when the results would approximate the conditions that might be expected during the life of the tractor. We expect next summer to take up this matter, and get some definite information that will be of value to those who contemplate replacing some of their horses with a small farm tractor.

TO IMPORT BREEDING SHEEP

THE Department of Agriculture is assisting farmers in the province to acquire breeding ewes. Farmers are invited to place their orders with the Department for the number of sheep they desire to purchase. The sheep will be secured in so far as they are available in the province of Ontario, principally from the stocks of ewe lambs that are being sold by the Ontario sheep breeders. Should the orders secured be greater than can be supplied from Eastern Canada, importations will be made from the Northern States, more particularly Montana. The Manitoba Department will select the sheep, pay for them and arrange for their distribution. The Dominion Department of Agriculture with the assistance of the railways will meet the freight charges on the sheep from Ontario in carload lots as outlined in the new transportation policy published in the October Gazette. Before the middle of October some four thousand sheep had been applied for. The farmers are required, when placing their orders, to prepay one dollar per head and to make the remainder of the payment when the sheep are delivered.

SASKATCHEWAN

ACTIVITIES OF THE DEPARTMENT OF AGRICULTURE

CO-OPERATIVE POULTRY MARKETING

TO facilitate the marketing of poultry the Department of Agriculture has again arranged to operate co-operative poultry killing and marketing stations at Regina and Saskatoon. Commencing on November 5th, poultry will be received up to and including December 8th.

Chickens, turkeys, ducks and geese will be handled, and the Co-operative Organizations Branch will make advance payments at the following rates, namely, For No. 1 chickens, 15 cents per pound; No. 1 fowl, 12 cents per pound; No. 1 turkeys, 18 cents per pound; No. 1 ducks, 14 cents per pound; No. 1 geese, 14 cents per pound, and for lower grades at corresponding prices. If market prices are low at the time poultry is received, it will be placed in cold storage until it can be sold to advantage, and when all the birds have been disposed of a final payment will be made, returning to the producer the full amount realized, less the cost of transportation, killing boxes and storage charges.

One notable change, and practically the only one, has been made in the regulations for this year's operations. All payments will be based on the live weight of the birds, when fasted and ready to kill, therefore, all birds must be sent in alive.

Last year 59,422 pounds of poultry were handled as against 27,038 pounds in 1915. It is expected that the same rate of increase will be fully maintained this year.

To advertise this co-operative poultry marketing work the Department has issued a conspicuous poster, printed in colours, announcing the conditions under which the poultry will be handled and giving instructions to enable producers to participate in it. These posters are exposed on the bulletin boards of banks and in other conspicuous places.

LIVE STOCK DISTRIBUTION

Up to the present time the Live Stock Branch has been successful in purchasing the majority of the cattle supplied under The Live Stock Purchase and Sale Act from Saskatchewan farmers who were over supplied with this class of stock. To secure an additional supply a representative of the branch is now purchasing in Winnipeg. Over two hundred head of grade heifers, one and two years old, besides the pure-bred bulls and dairy cows, have been supplied and orders are on hand for another two hundred head, which it is hoped to secure within the next few weeks.

The branch has received some orders for sheep, and many enquiries are also being received so that a big demand is assured which is the natural consequence of the high prices for both wool and mutton now prevailing. About two thousand head of grade range ewes from one to four years old have been purchased for October delivery in anticipation of this demand.

A few applications for stock under the Act have already been received from returned soldiers, and it is expected that the regulations and special terms to be granted these men will shortly be published. The sheep and swine sales are to be held at the time of the winter fairs, namely on November 30 at Regina and on December 6 at Saskatoon.

BRITISH COLUMBIA

THE UNIVERSITY AND AGRICULTURAL INSTRUCTION

BY V. S. KLINCK, DEAN OF THE COLLEGE OF AGRICULTURE

IN British Columbia the College of Agriculture is an integral part of the Provincial University. Its class-rooms and laboratories are located on the same campus as are those of the other faculties of the university. During the coming year lectures in agriculture will be given in the temporary quarters occupied by the university in Vancouver; while laboratory-work will be given in the fields, gardens, and live-stock stables at the permanent site at Point Grey.

For the past three years land-clearing operations and field experimental work have been proceeding at the permanent site. One hundred acres of land have been cleared and are now under crop. The experimental results obtained during the past two years have proved of much value in determining the most approved methods of bringing heavily timbered upland soils into cultivation. The allotments of land made to the different departments have been especially prepared for experimental and investigational work. These lands—the farm-fields, the agronomy grounds, and the horticultural gardens and orchards—constitute the more important field laboratories of the College of Agriculture.

A substantial two-story horticultural storage-barn has been erected and funds are available for the erection of such additional buildings and for the purchase of live stock and general farm equipment as are necessary for the teaching of the different subjects in the courses outlined.

THE LINES OF STUDY

Two distinct lines of study are offered, as follows:—

(1) A four-year course leading to the degree of B.S.A.

(2) A series of short courses.

Before entering upon the course leading to the degree of B.S.A., students in agriculture are required to have junior matriculation, or its equivalent. This degree is granted only after the successful completion of four years of lecture and laboratory work. The course is planned for students who wish to obtain a practical and scientific knowledge of agriculture, either as a basis for demonstration and teaching or as an aid to success in farm-management.

The first two years of work leading to the degree in agriculture is devoted to acquiring a knowledge of the basic sciences upon which agriculture rests, in adding to the students' knowledge of mathematics and language, and in laying a foundation for more advanced studies in practical agriculture. The third and fourth years are devoted almost wholly to courses in applied agriculture.

Except under special circumstances students will not be eligible for registration under the age of seventeen. Specialization will begin at the commencement of the third year.

SHORT COURSES

The work of the short courses is intensely practical. Lectures are reduced to a minimum. Illustrative material and periods devoted to demonstration and judging work are strong features of the courses. No entrance examination is required, nor are students asked to write an examination at the conclusion of the course.

The first short course to be offered this fall will be given in horticulture, and will extend from November 20th to November 30th, inclusive. The time in this course will be devoted entirely to commercial fruit-growing, vegetable gardening, and related subjects. If interest warrants it, a special course of one week will be offered in amateur vegetable-gardening, landscape-gardening and floriculture.

The second course will be a combined one in agronomy and animal husbandry, and will be arranged to meet the needs of the general farmer. Under agronomy soils and their management, field crops and their cultural requirements will be studied. Under animal husbandry special attention will be given to the judging of all classes of live stock and to their care, feeding, breeding and management. Special courses will be arranged for returned men who are desirous of taking up farming, and a two weeks' course in poultry husbandry and apiculture will be announced if negotiations now under way result in satisfactory arrangements being made.

SCIENTIFIC BASIS OF AGRICULTURE

For the past two years a course on the scientific basis of agriculture has been given as an elective to junior and senior students in arts. The first short course to be given under the auspices of the university was offered last February and proved a decided success. During the past six months the members of the Faculty of Agriculture have been assisting the provincial Department of Agriculture in numerous short courses in different parts of the province. They have also rendered valuable assistance to the Department of Education in connection with the summer school for teachers.

STALLION ENROLMENT IN CANADA

RETURNS FROM EACH PROVINCE FOR THE PRESENT YEAR

Stallion enrolment now exists in all the provinces of Canada excepting New Brunswick and Quebec. From returns received at the office of THE AGRICULTURAL GAZETTE the following table has been compiled, showing the number of enrolments for the present year in each of the provinces:

Breed	P.E.I.	N.S.	Ont.	Man.	Sask.	Alta.	B.C.	Totals in breed
Clydesdale	21	46	1038	499	1466	135	40	3245
Percheron	3	12	299	157	695	114	14	1294
Shires	1		42	6	39	9	2	99
Suffolk			3		26	3	3	35
Belgian			19	25	124	13	3	184
French Draft							5	5
French Canadian			4	3	1			8
Standard-bred	29	50	280	36	118	5	6	524
Thoroughbred			31	1	16	4	6	58
Hackney		3	60	21	32	2	8	126
French Coach		1	6	3	5	1	2	18
German Coach			7	3				10
Saddle Horse				1	2			3
American Trotting							4	4
Morgans		1		1	1			3
Ponies and Morgans			4		1			5
Totals	54	113	1793	756	2526	286	93	5621
Grades		152	640		336	196	18	1342
Scrubs					360			360
Total No. of horses enrolled in each province	54	265	2433	756	3222	482	111	7323

PART III
Rural Science

NOVA SCOTIA

RURAL SCIENCE TEACHERS AND SCHOOL GARDENS

BY A. H. McKAY, B.A., LL.D., SUPERINTENDENT OF EDUCATION FOR NOVA SCOTIA

IN preparing teachers for rural Science, we select from the Normal College the most promising teachers, and after the college closes in June they do special work in July and August. If the teachers do not complete their work then they can cover it at the next vacation and obtain a special license, for which they get an extra grant in the school, and then they are expected to do the special work already described.

The school gardens have not been very successful, because during the long vacation in July and August they are apt to run to waste. We made a change in our regulation allowing school trustees to arrange for a visit to those gardens during July and August, and to count every visit as a day's attendance at school for the pupils immediately concerned, so that in the return they would draw on the municipal fund for those days, but the amount appeared to be so small that not much use has been made of the regulation, so we are turning now to home gardens, or as some call them, home projects.

THE PLAN FOLLOWED

The home garden must be very carefully described; there must be lying on the teacher's desk a plan of the garden drawn to scale, and a plan of the different beds, with what is raised in each of them, and the pupil has to report every week on that work, so that these gardens are nearly as well supervised as those at the school, on account of the plans. Then there is this advantage, that at the end of June the garden looks very flourishing and those at home are greatly interested in keeping it in good order so as to have something to send up to the county or local exhibition. Photographs are made and published in a bulletin for the encouragement of others.

We have over 100 teachers this year who have been drawing an extra grant of $15, $20, $25, or more. We give professional grants up to $75 or $90, but we laid down standards so high for those higher schools that few come up to them. I think we are gaining when we give a grant that makes it worth while for people to compete with each other.

RURAL SCIENCE ACTIVITIES

BY L. A. DEWOLFE, B.A., DIRECTOR, RURAL SCIENCE SCHOOLS

CHILDREN'S home school gardens constitute an important part of the Rural Science work carried on in the province of Nova Scotia. Reports have been received of 4,176 children's home gardens planted last Spring. These covered an area of forty-two acres. Of the schools that reported, Sydney leads with 1024 gardens, having a combined area of five acres. Besides the general gardens, local contests were organized as follows:—

8	schools	organized	hog	raising	contests
8	"	"	calf	"	"
5	"	"	lamb	"	"
13	"	"	chicken	"	"
14	"	"	potato	"	"
6	"	"	turnip	"	"
3	"	"	mangel	"	"
3	"	"	grain	"	"
5	"	"	cooking	"	"
4	"	"	canning	"	"

In the Rural Science Bulletin, of which the writer is editor, teachers are urged to report the results of these contests and to assist the children in securing photographs of their gardens.

RURAL SCHOOL CONSOLIDATION

IN further explanation of matter that appeared on page 901 of the October Number of THE AGRICULTURAL GAZETTE, Mr. A. H. McKay, Superintendent of Education for Nova Scotia, writes:

"As the summary of the application of the Provincial Act of 1903 in aid of School Consolidation that appears on page 901 of THE AGRICULTURAL GAZETTE may be misunderstood, I state the regulation more fully as follows:—

$36,000 (an average of $2000 for each county) was voted by the Nova Scotia Legislature (Statutes of 1903, Chapter 22) to aid the consolidation of school sections.

The Council of Public Instruction under this Act ordered that, subject to special condition, from $200 to $250 of the said $36,000 may be granted to aid in the erection and equipment of the school building of the consolidated section for each normal-sized rural section absorbed in to the central one—the total in no case to exceed $1000. Thus, a consolidation of two sections may receive for the building $200; of three sections, $400; of four sections, $600; of five sections, $800; of six sections, $1000—the maximum—when the normal unit of $200 is applicable.

ONTARIO

EXAMINATION AT SCHOOL FAIRS

BY E. K. HAMPSON, DISTRICT REPRESENTATIVE, WELLAND COUNTY

IN our school fair work I have replaced the requiring of a written essay by the pupils with an agricultural examination. During the summer I sent a list of questions to all of the boys and girls who had plots. Immediately upon the opening of the schools after the summer holidays, a set of these questions was placed in the hands of the teacher with a request that assistance be given the pupils in answering the questions submitted. In order to assist the pupils, I sent to each school a set of bulletins issued by the Dominion and Provincial Departments of Agriculture on live stock, horticulture, field crops and other subjects.

These were to be made available to the pupils in preparing for the examination and form the nucleus of an agricultural library in the school. At each fair examination papers based on the questions previously submitted were given to the pupils. In the case of one of the school fairs, more than forty of the pupils competed. Special prizes including a silver medal were awarded to the winning pupils. This method is proving one of the most valuable educational features of our school fair work and I intend to continue it in following years.

Following are the questions sent to the boys and girls:—

QUESTIONS FOR BOYS

1. Name 3 prominent breeds of heavy horses.
2. Name 3 prominent breeds of swine.
3. Name 3 prominent breeds of beef cattle.
4. Name 3 prominent breeds of sheep.
5. Name 3 prominent breeds of dairy cattle.
6. Be prepared to write a short essay on "How I would feed a Dairy Calf."
7. Name two good varieties of oats.
8. Name two good varieties of fall wheat.
9. Be prepared to write a short essay on "The preparation of the ground for Seeding."
10. Name five varieties of fowl which might be termed General Purpose Fowl.
11. Name two varieties of fowl which are noted specially for egg production.
12. Be prepared to write a short article on "Feeding and Caring for Young Chickens."
13. The kind of house in which your hens live is important. What are the essentials which one must observe in building an ideal poultry house?
14. Name ten weeds which grow in your locality.
15. Explain the difference between Annual, Biennial, and Perennial with reference to plants.
16. Be prepared to write a short article on "How to Control Weeds".
17. Name five insects which are injurious to crops, orchard or garden.
18. Be prepared to write a brief description of the life history, nature of injury and methods of control of the following: Cabbage Worm, Potato Beetle, White Grub.
19. What are the four different stages in the life of an insect.
20. Name 3 diseases of crops, fruit or vegetables which are caused by a fungus.
21. What are the methods of prevention of: (a) Smut in oats: (b) Blight of potatoes; (c) Worms in Apples.

QUESTIONS FOR GIRLS

1. Define:—Embroidering, hemstitching, tatting and crotcheting.
2. Be prepared to write a short note on "The Baking of Bread."
3. Give the name and amounts of ingredients used in making plain white cookies.
4. Name some vegetables suitable for canning.
5. Be prepared to outline briefly the method of canning vegetables.
6. Be prepared to outline briefly the method of preserving fruit.
7. Name (6) annual flowers suitable for a border or bed in the lawn.
8. Name (6) perennial flowers suitable for ornamenting the lawn.
9. Be prepared to write a short article on "How I would improve the front lawn".
10. Name (3) varieties of shrubs suitable for a low hedge.
11. Name (3) varieties of shrubs suitable for the lawn.
12. Name (3) varieties of vines suitable for covering fence or buildings.
13. Be prepared to write a short article on "The preparation of the garden for sowing".
14. Be prepared to write a short article on "The value of a vegetable garden to the farmer".
15. Name (10) kinds of vegetables suitable for growing in a farmers garden.
16. Name (3) kinds of fowl which might be termed "General Purpose Fowl."
17. Name (2) kinds of fowl which are specially noted for egg production.
18. What would you consider a good mixture to feed a flock of hens to stimulate egg production.
19. Be prepared to write a short article on "The feeding and care of young chickens".

NEW BRUNSWICK

AGRICULTURAL INSTRUCTION, NORMAL SCHOOL, FREDERICTON

BY R. P. GORHAM, DIRECTOR OF AGRICULTURE AND NATURE STUDY

THE students in the Normal School at Fredericton, who receive agricultural instruction, are divided into five classes. Two of these classes are studying for first class licenses and three of these for second class licenses. There is a small additional class of French students.

The students working for second class licenses, have two forty minute periods a week for Agricultural and Nature Study. The other classes have three small periods per week. I find a forty minute period too short for laboratory work but I am endeavouring to teach every lesson from an object in the hands of the pupils and as far as possible to connect each lesson with their everyday experiences.

The following is an outline of the course covering the school year:—

September:—Study of food plants in school garden, corn, bean, potato, tomato. Collection of weeds, identification of all weeds found. Collection of eight types of economic plant diseases.

October:—Study of food plants continued, carrot, turnip, grain, apples. Harvest practices and reasons. Collection of weed seeds, identification and study of methods of dispersion.

November:—Fall care of the school garden, fall work on the farms. Preparation of plants for winter. Types of soils.

December:—Trees, fur-bearing animals, snow and ice.

January:—Domestic animals, breeds of cattle, uses and care. Winter birds.

February:—Study of plant diseases collected in the fall. Lumbering and values of lumber.

March:—Seed germination, movements of sap, spring birds, insect life.

April:—Seed selection, preparation of hot beds, fertilizers, school gardening.

May:—Farm practices, rotations, inside life.

QUEBEC

MACDONALD COLLEGE

SCHOOL LUNCHES IN RURAL DISTRICTS

BY JEANNETTE BABB, HOUSEHOLD SCIENCE ASSISTANT

THE Household Science Department of Macdonald College has made an effort through its Extension Department, aided by the Homemakers' Clubs, to show how conditions can be improved in our rural schools and academies. Among other undertakings, a demonstration on "The School Lunch" has been given in a number of rural schools and in several of the academies throughout the province, in centres where there is a Homemakers' Club and in other schools which had asked for it. During the past year this demonstration has been given in 27 different places where there were Homemakers' Clubs.

IMPORTANCE OF THE LUNCH.

Too often the school lunch is looked upon as a sort of refreshment between meals. It, however, takes the place of the main meal of the

day with the majority of children, and, therefore, requires the most careful planning and attention, more so than the regular meals of the rest of the family, because the school lunch is very often eaten amidst dreary surroundings and not in a cheery, clean dining room with the other members of the family. In the majority of schools the children have liberty to eat their lunch where and how they choose, and the manner in which it is partaken of is not conducive to health. For these reasons the food should be especially tempting and nourishing. The choice should include such foods as stimulate the appetite by supplying both daintiness and variety. The lunch for the growing boy and girl should be planned with particular care in order to satisfy the demand for good taste and to supply the proper amount and kind of nourishment. The factors to be considered in planning the box lunch, either with or without the hot supplement, fall naturally under four heads:—

1. Selection of foods.
2. Preparation of foods.
3. Packing the lunch.
4. Serving the lunch.

SELECTION OF FOODS.

The most important of these is the selection of foods. They must supply the demands of the growing boy or girl. What are these demands? They may be briefly described as follows:—

1. Foods that supply the growth of bodily tissues, such as nerve, bone, blood and muscle.

2. Those that supply power to work and to play, and give the necessary clearness of brain to study.

The lunch box should always contain such food-stuffs as:

(1) Those that supply a substantial background of plain nutritious and milk flavoured foods, e.g., bread and butter, bread and egg, bread and milk, sandwiches of chopped egg, nuts, meat, cheese, brown bread in some form.

(2) Succulent foods, e.g. apples, lettuce, celery, tomatoes, dates, raisins, oranges or apple sauce.

(3) A dessert or dainty, e.g. custard or puddings, gelatine jellies, plain cake, cookies, homemade candy or maple sugar.

A good lunch should consist of a combination of one article from each of these groups supplemented by hot cocoa or soup, or in summer plain whole milk. Well balanced meals tend to keep the child in good condition, give him good habits, and make him a table companion.

PREPARATION OF THE FOOD.

The preparation of the food is the next thing to be considered. It must be well cooked. Here is an excellent opportunity for the use of good left-overs. With a little skill many scraps of food that appear unattractive may be made very appetizing and used up in this way, thus practising true ecomony. Dried cheese may be combined with salad dressing, or cream and seasoning; left over fish may be flaked and mixed with salad dressing for sandwich fillings; stale cake may be made into dainty desserts.

PACKING THE LUNCH.

The third point to be considered is packing the box lunch. This also demands careful attention. A suitable box should be chosen which is light, easy to carry, can be washed and kept in a sanitary condition. We recommend a tin box for this purpose. To aid in packing use paraffin paper for lining the box and wrapping each article separately; paper or crepe napkins, custard cups, jelly tumblers, screw top jars and bottles are a great aid in packing the lunch box, which should be an example of neatness, convenience and attractiveness.

Psychologically what appeals to the eye appeals to the appetite. Unattractive food is not eaten with

relish, and is most likely not eaten at all. Wrap the parcels neatly, putting as far as possible each one in a separate wrapping paper. Place them in the box in proper order, with the heavier ones in the bottom. Whether packed in tin or paper boxes or just in plain wrapping paper see that they are neatly put up. Whenever possible let the children do the wrapping, and teach them to do so carefully and neatly. The pride of the children in carrying a neat and attractive lunch amply repays for the extra effort.

ACCOMMODATION FOR SERVING

Wherever possible the children should have a room set apart for serving the lunch. Where this is not feasible some space should be given over to it in one of the classrooms. It should be put in order and properly aired before the children sit down to their lunch each day. Where tables cannot be supplied the desks should be wiped off by the children. One of the napkins should be used as a table cloth and the lunch spread out upon it. Then the cocoa or soup should be passed around to them in cups or bowls supplied either by the parents or by the School Board, having all the children sit down together as one family to enjoy their lunch. They should also be encouraged to discuss suitable subjects and in this way learn the art of really good conversation. The supervision of the noon hour is very important in the formation of good habits of right living and thinking. The School Board should undertake the furnishing of the necessary equipment, the whole outlay for which need not exceed $20.00. The cost of fuel amounts to about 3c per day, the cost of supplies for cocoa for each child per day is 2c, and the cream soup 3c per day.

EXAMPLES

The Lennoxville Academy is the first school to fall in line in the establishment of a supervised lunch room where cocoa is served to the children each day as a supplement to their box lunches. They use a room in the basement which is light and airy. The School Commissioners supplied a built-in cupboard and two table tops which can be set up on trestles. A two-burner oil stove was donated. The Lennoxville Homemakers' Club, with the co-operation of the School Commissioners and Mr. Dormer, the principal of the academy, have helped along this good work. The club, besides providing the other necessary equipment, undertook to supply the necessary materials for each week and pay a woman 25c per day for preparing the hot supplement and supervising the noon lunch. They have supplied a cup of cocoa per day for each child for the small cost of 1c per day and have saved over three dollars since the 1st of March.

Compton Consolidated School and several other rural schools have served a hot supplement during this past year, and the Compton School Board intend providing the proper equipment when their school opens for the fall term. Every community visited reports a great improvement in the quality, packing and serving of the lunches.

NOON LUNCH EQUIPMENT LIST

The necessary equipment for 12 students can be given as follows:—

NOON LUNCH EQUIPMENT LIST

No.	Article.	Decsription	Price	Cost
A.	Granite Ware.			
1	Kettle	Preserving "Grey" covered 8 qt	.70	.70
1	Doubleboiler	"Grey" 4 qt	1.10	1.10
2	Plates	White 10 inch	.25	.50
1	Ladle	"Enamelled steel", flat handle 4½ inch	.35	.35
B.	Tin and Wire Ware			
1	Tray	"Oblong" Japanned, 22 inch. extra heavy	1.25	1.25
2	Measuring cups	½ pt. marked in 1-3s and ¼s	.08	.16
1	Strainer	"Fruit" wire with masher	.35	.35
1	Soapshaker	Wire	.15	.15
C.	China, Crockery and Cutlery.			
12	Cups and saucers	Best quality, hotel ware 304/3	1.80	1.80
12	Bowls	" " " 119/19	1.50	1.50
2	Bowls	Mixing 10 inch. C. C. rolled edge	.35	.70
18	Teaspoons	Heavy, solid nickle	1.00	1.50
12	Dessertspoons	" " "	1.60	1.60
2	Tablespoons	" " "	.18	.36
2	Knives	Dinner, case	.20	.40
2	Paring knives		.15	.30
D.	Linen			
6	Dish towels	Plain white towelling 1 yd long, ¼ in. hems	.14	.84
6	Dish cloths	Plain white towelling, ½ yd. long, ¼ in. hems	.14	.42
4	Scrubcloths	Crash towelling, red border, ½ yd. long, ¼ inch hems	.10	.20
E	Miscellaneous.			
1	Wooden spoon	Round handle, 8 in. size	.20	.20
1	Can-opener		.15	.15
1	Stove	"New Perfection" Oil No. 2	9.00	9.00

MANITOBA

BOYS' AND GIRLS' CLUBS AND THE PUBLIC SCHOOL

BY S. T. NEWTON, DIRECTOR, AGRICULTURAL EXTENSION SERVICE

IN the elementary schools the boys' and girls' club method of teaching agriculture is very generally followed, and over 15,000 Manitoba boys and girls are enrolled in from three to six of the twelve contests which are included under boys' and girls' club work.

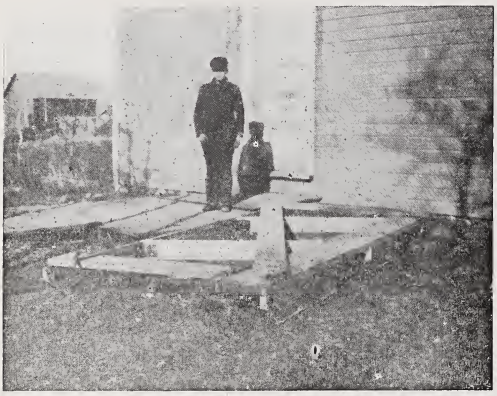
In this work the Department of Education co-operates with the Department of Agriculture, and as a consequence there is no duplication of effort and the best support of all branches of both departments is freely given at all times.

As far as possible the work is made of a practical nature, and for the most part is carried on at home under the direction of the teacher. In this way the home and school are linked up in such a way that the organizing ability of the teacher is combined with the sound practical experience of the parents as well as other expert farmers in the district, for the boy who is raising chickens is not content until he has questioned the best poultry raisers in the district as to the best methods to follow.

Before organizing the clubs each year the opinions of parents, inspectors and teachers who have met with most success are secured as to the needs for the coming year.

By putting boys' and girls' club work on a contest basis, and having

each contest of real economic value, children as well as parents become interested in this phase of school work. For this reason the number of participants in such contests as poultry raising, pig raising and gardening is increasing each year. Children who cared for a couple of pigs throughout the summer and sold them at the conclusion of the fair at from $75.00 to 80.00 not only have a snug sum to put in the bank, but have increased their knowledge in one branch of agriculture in a way that would not have been possible in studying out of books alone.



ROAD DRAG MADE BY BOYS AT MANUAL TRAINING SCHOOL, KILLARNEY MANITOBA

The total school population in Manitoba is 103,000, and when we deduct 40,000, the number in attendance at Winnipeg and Brandon schools, and probably another 15,000 who are under ten years of age and consequently too young for boys' and girls' club work, it will be seen that the 15,000 enrolled in boys' and girls' club work takes in almost all the children of the province who would naturally be expected to take an interest in the subject.

Further encouragement in club work is given by various mercantile firms in providing a free trip to the Agricultural College, while a whole week of instruction and entertainment for between35 and 40 of the prize winners is given.

Many of the clubs offer as much as $500.00 in prizes, and an effort is made to have a prize even though it is small for every child who has done his best. At one fair 22 prizes were offered and by placing all the exhibits the child getting say twenty-first place knew how far up a very long ladder he had been able to climb, whereas if only three prizes had been given he would not know how many were ahead of him.

At the close of each fair the judges carefully explain the good and bad features of the various exhibits, and these in themselves prove most in-



STUDENT AT MANUAL TRAINING SHORT COURSE McCREARY, MANITOBA, AND THE WAGON BOX HE MADE

teresting and instructive lessons in agriculture.

After five years' experience in the boys' and girls' club method of teaching agriculture there are very few people in Manitoba, parents, teachers or inspectors who are not strongly in favour of it, and the problem of the future is to so organize the work that all the children and teachers will understand what is expected of them.

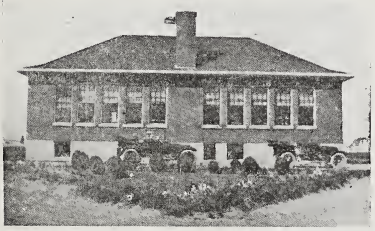
NOTE—Details of the organization and work of the boys' and girls' clubs in Manitoba will be published in a later issue of THE AGRICULTURAL GAZETTE.—*Editor.*

SASKATCHEWAN

AN EXAMPLE OF SCHOOL GROUND IMPROVEMENT

BY BERT A. SEE, CHAIRMAN, GRIFFIN SCHOOL DISTRICT

PERHAPS I am more enthusiastic over work of this kind than the average rate-payer, at any rate I must confess I am proud of our school and school grounds, I am also pleased to be able to add that many of our tax payers as well as our inspector, our director of school agriculture for the province and I believe the whole Department of Education are proud of it as well.



PLANTING ON SCHOOL GROUND, GRIFFIN, SASKATCHEWAN



AGRICULTURAL PLOTS, COLLEGIATE INSTITUTE, WEYBURN, SASKATCHEWAN

A year ago the first of August the spot where our beautiful new school now stands was but a parcel of unfenced summer-fallow containing about seven acres of land, today we have, and I feel perfectly safe in saying this, the finest and best equipped two-room school and the best fenced, best laid out and best cultivated grounds in the province. People rom all parts of the country gaze with wonder and delight when they are told that this has all been done in a season and in addition to the benefits our own people are deriving we have set a pace and set up a model for rural, village, town or even city school districts all over the province. Our building is of brick, fine appearing from the outside and located in the centre of the grounds, inside there are two large sanitary, well-lighted, well-ventilated and well-equipped class rooms divided by a noiseless movable partition that can be set aside in a few minutes throwing the building into one large assembly room which was appreciated by community gatherings last winter. The building is also steam-heated throughout and in addition to the class rooms the building contains a well equipped kitchen used in dom-

estic science work as well as warming the noon day lunch when needed. There is also a well equipped science room, two large well arranged cloak rooms and a commodious hall. Under the building is a full basement, the furnace room and a good large coal room in the centre and boys and girls play rooms on either side. The basements are also equipped with well heated lavatories as well as a concrete cistern holding about a hundred barrels of water.

Under the supervision of our groundsman the school grounds have been transformed from a parcel of summer-fallow to a park, beautiful and well kept school gardens, automobile drives, beautiful patches of lawn surrounded by flowers of every description; trees have been planted around the entire grounds for a shelter belt and about one-third of the ground has been set aside and used for experimental plots where agriculture will be taught the pupils. Next year we are planning to make even a greater transformation in the grounds and if possible I would like to arrange for a meeting here of all the school trustees in the province about the middle of August next year so they may see a living example of what can be done in promoting school agriculture in town, village and rural schools.

We have received considerable encouragement from Mr. Ross, Chief of Forrestry Department, Indian Head, Mr. Vensky, Superintendent of Parks of the city of Regina, A. W. Cocks, Director of School Agriculture, Regina, and also from the Agricultural College at Saskatoon, for which we are grateful and we will appreciate any help or suggestions from any branch of the Department of Agriculture. We are out to set an example.

BOYS' AND GIRLS' CLUB SWINE CONTEST

THE Rural Education Association of Weyburn, Saskatchewan, of which Mr. A. Kennedy, Inspector of Schools, is the secretary, is carrying on a boys' and girls' club swine contest. The accompanying illustration, supplied by Mr. Kennedy, represents a litter of seven Tamworth pigs entered by Herbert Thompson, one of the members of the club. At the first judging, which took place on June 9th, this litter won thirty-eight points out of a possible fifty, while at the second inspection, two months later, fifty-five out of a possible seventy-five points were secured.



A CONTEST LITTER

SCHOOL GARDENING IN 1917

BY A. W. COCKS, B.Sc., DIRECTOR OF SCHOOL AGRICULTURE

In the March number of The Agricultural Gazette the Directors of School Agriculture for Saskatchewan reported that gardening in connection with schools was conducted in most cases on the school grounds and that gardening at home, under the supervision of the teacher, is seldom undertaken except when, for some reason, the school grounds are unsuitable.

EDUCATIONAL VALUE OF THE WORK

The officials of the Department in the past have always emphasised particularly the educational value of school gardening, but this year, owing to the need for greater production, the attention of teachers and pupils was specially directed to the ecomonic value of the work. By means of articles in the Saskatchewan Rural Education Monthly, which is a bulletin published by the Department of Education and supplied free to all teachers in the province, teachers and pupils were urged to devote their garden to vegetables and other crops of food-producing values. An effort has been made recently to obtain, by means of a questionnaire, some idea of the number of schools with gardens, the number of children taking part, and other information of a similar nature. Answers have not yet been received from all the school districts in the province and practically no returns are on file at the Department from the cities or large towns. Possibly over 3,500 school district had schools in operation during the past summer, but replies have been received up to the present from only 1,550. The information thus obtained indicates that about 1,000 of these 1,500 districts have gardens on the school grounds, while in 225 cases home gardens have been organized by the Department. The number of pupils receiving instruction in gardening, either at home or at school, is re-



SCHOOL GARDEN, QU'APPELLE, SASK., IN MAY

ported to be slightly over 17,500. It is estimated that were reports received from all school districts in the province the figures herein given would be almost doubled.

With regard to the distribution of the produce—this is a matter which has been left to the teacher and pupils themselves. The Department has simply suggested that care be taken of all food produce and has urged the canning of all surplus vegetables and fruits. Instructions respecting canning have been supplied to the teachers through the medium of the monthly bulletin. It is probable that most of the produce from school gardens has found its way to the home table, but in a few cases it has been sold to raise funds for patriotic purposes; for example, the schools of the Lost River municipality pledged themselves at the beginning of the season to contribute $1,000 to the Belgian Relief Fund by growing saleable vegetables. Other schools have devoted the whole of their gardens to the growing of potatoes for food or for seed.



SCHOOL GARDEN, QU'APPELLE, IN JULY

SATISFACTORY PROGRESS REPORTED

The progress in school gardening in the Province of Saskatchewan during the past three years has been very satisfactory, particularly when it is considered that the work is not supported at the present time by means of a Government grant. It is just possible that some more definite recognition by the Department of the value of school gardening would considerably increase the efficiency with which the work is carried on.

BRITISH COLUMBIA

AGRICULTURAL COURSE AT VICTORIA HIGH SCHOOL

BY J. W. GIBSON, M.A., DIRECTOR OF ELEMENTARY AGRICULTURAL EDUCATION

A COURSE in the study of agriculture was commenced at the Victoria High School with the fall opening. The initial class includes upwards of 30 boys and girls. This new course is being inaugurated as a result of negotiations carried on last spring between the school boards of Victoria and Saanich and the Department of Education. It is a two-year course, and will occupy the time heretofore allotted to the study of one of the foreign languages, with which it is made optional. Whereas, it has been compulsory in the past for high school students to take up the study of two foreign languages, it now becomes permissible for them to omit one or both of these, and take the course in agriculture instead. The only condition is that students wishing to qualify for first-class teachers' certificates or wishing to enter the University must include with agriculture the study of one foreign language. In all the other regular high-school studies no difference is made for those taking the course in agriculture.

WHAT THE COURSE INCLUDES

The course itself covers all the usual branches of agriculture and with some slight variation in the second year is the same for girls as for boys. It is the intention in the second year to stress certain phases of domestic science for girls and certain special topics in agriculture for boys. The work in agricultural science naturally associates closely with the regular high school science course, and will be conducted in accordance with the best modern methods, which combine experimental work in the field and laboratory with class-room instruction. For the present the out-door work in experimental agriculture will be conducted in the grounds used by the summer school students in agriculture, located close to the high school.

The agricultural course will be in charge of Mr. Horatio E. Hallwright, B.S.A., a graduate of Manitoba Agricultural College. During the summer of 1916 Mr. Hallwright was acting Horticulturist at the Dominion Experimental Farm at Brandon, Manitoba, and during the past summer was in charge of the tree planting work inaugurated by the Canadian Pacific Railway Company in Alberta and Saskatchewan.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

THE FOOD CONTROL COMMISSION

WHEN early in the past summer it became known that the food situation of the world was critical and that crops in many countries were wholly or partially failures, food controllers were appointed in Canada and the United States. The Honourable W. J. Hanna was selected by the Dominion Government. In connection with this step the collective food experience of the Dominion is being employed to solve the food problem and secure essential food supplies for Great Britain and the Allied armies and nations. The closest possible co-operation is being observed between the Food Controller's office, the Federal and Provincial Governments, and national and local organizations of a public character.

The basis of organization of the Food Controller's office provides for the creation of six departments to deal with various phases of the food problem.

There is a central Advisory Committee composed of representatives of the Government, the churches, labour organizations, educational departments and institutions, urban interests, farmers, rural municipalities, and men's and women's organizations. It is the province of this central body to advise the departments through the Food Controller.

Provincial machinery has been established through the creation of special provincial committees to advise upon plans prepared by the departments and approved by the Food Controller. Each provincial committee includes in its personnel representatives of the Government, of the churches, of the schools, of the farmers, of labour of urban and rural districts, and of men's and women's associations. In addition, special committees, representing producers, manufacturers, handlers and consumers of food products, have been appointed to investigate and formulate plans for action on individual problems dealt with by the departments. The first committees to be formed in this connection were the Food Consumption Control Committee and the Fish Committee.

THE VARIOUS DEPARTMENTS

The interior organizations of the Food Controller's office includes: Food Saving Department, Food Industries Department, Food Distribution Department, Information and Statistics Department, Business and Office Department, Educational Department.

The Food Saving Department deals with such problems as:—

(*a*) Consumption in public eating places, etc.
(*b*) Instruction in methods of conservation in private houses.
(*c*) Instruction in preservation of perishable products.
(*d*) Instruction in substitution of foods to take the place of those required for export.
(*e*) Securing the co-operation of national, provincial and local organizations.

The Food Industries Department has charge of:—

(*a*) Matters relating to flour, bread, meat, fish, dairy products, canned and all manufactured food.
(*b*) Preparation of certain foods in order to encourage their use and to insure plentiful supplies.

The Food Distribution Department is divided into sections:—

(*a*) To deal with purchase, prices, storage, transport, and sale of food for home consumption and export problems.
(*b*) To advise with British and foreign buyers.
(*c*) To advise with handlers and shippers.

The Information and Statistics Department has sub-divisions to:—

(*a*) To gather statistics from Government Departments and international sources, and tabulate them for the use of the other departments.
(*b*) Ascertain the quantity, location, ownership and sources of food supplies for home consumption and for export.

The Business Department in charge of the Assistant Chief of Staff handles general office organization, accounting, finances, office supplies and the systematic filing of data and correspondence.

The Educational Department is responsible for the dissemination of general news for the information and instruction of the public and for the publication of educational and other matters supplied to it by other departments.

ACTS RELATING TO AGRICULTURE

DRAINAGE IN ALL ITS PHASES

It will be seen by the review that follows of the various Acts that have been passed by the provinces of the Dominion that very considerable attention has been bestowed upon drainage in all its phases. Although several of the measures are conducted and under the control of the provincial Departments of Public Works, yet they are so intimately connected with the cultivation of the land, and thus with agriculture, that they have been dealt with as if directly connected with the different Departments of Agriculture.

PRINCE EDWARD ISLAND

By the Drainage Act of Prince Edward Island, passed in 1916, upon a petition according to form of the majority of the resident and non-resident owners of the lands to be benefited, an engineer is to be appointed to make a report under oath of the necessity for the work, of the cost, of the extent of the lands that will be benefited and of any damage that may be caused. He is also required to assess the lands through which the drain will pass according to the value of the benefit likely to be derived. A copy of the report must be sent to the Commissioner of Agriculture and to any person indicated by the petitioners. For the purpose of meeting any objections that may be raised, the Commissioner must call a meeting of parties interested at which the engineer must be present with his report. The report having been adopted by vote any person objecting to his assessment has right of appeal to the County Judge. If the report be confirmed, the costs of the appeal must be paid by the appellant. If any change is made the other assessments must be altered to comply therewith. The engineer is to have sole charge of the work. If any owner neglects to maintain his portion of the drain any other owner whose lands are affected can notify the owner at fault and, if the necessary repairs are not made within ten days, can notify the engineer, who must take action. If any owner desires a loan for tile drainage purposes, he can apply to the Commissioner and his request can be complied with to the extent of $14 per acre, repayment to be made within 20 years in equal annual instalments on December 1st in each year at a rate of interest to be set by the Lieutenant-Governor in Council, but not to exceed the rate paid by the province. Applications for loans must be accompanied by certificates of titles and by statements of encumbrances, if any. The charges take precedence over all dower and rights of dower. The Government can issue debentures to meet the expenses incurred under the Act and must set aside 2½ per cent of the money thus raised as a sinking fund to go towards the redemption of such debentures.

TILE DRAINAGE IN NOVA SCOTIA

The principal Act in force in the province of Nova Scotia in connection with drainage of farm lands is "The Tile, Stone and Timber Drainage Debenture Act," 1910, Chapter 11, amended in 1914, Chapter 53. There was also an Act to assist purchasing of ditching machines in 1912, Chapter 21, but this was repealed in 1917, and Chapter 11, "An Act to assist in the Purchase of Power Machines for Agricultural Purposes", substituted. This latter Act, as noted in the July number of THE GAZETTE, page 563, made provision for the Governor-in-Council making a grant on the recommendation of the Secretary for Agriculture to assist in the purchase of power ditching machines, clover hullers or like machines.

The "Tile, Stone and Timber Drainage Debenture Act. 1910," is cited as "The Tile Drainage Act". It authorizes municipal councils to pass by-laws for borrowing in sums of not less than $100 and for the issuance of debentures payable within twenty years at 5 per cent interest per annum, for purposes of the Act. The entire amount of the indebtedness so incurred must not exceed $10,000. Each debenture must bear a coupon calling for $7.36 to meet the interest and to provide a sinking fund. The debentures must be made payable to the Provincial Treasurer. The Commissioner of Municipal Sinking Funds is required to report upon the advisability of investment in the project proposed in the by-law. Any owner of land wishing to borrow money for the purpose of tile, stone or timber drainage can make application to the council in set form. Debentures must not be issued in excess of 75 per cent of the estimated cost of the work. The province can invest in such debentures to the extent of $50,000 in the aggregate. Municipal councils can lend the money raised in sums of not less than one hundred dollars and no more than $1,000 to any one person. The money borrowed must not require the levying of a rate of more than three cents in the dollar upon the value of the land to be drained. Owners can secure discharge from their indebtedness by paying the treasurer of the municipality the amount due plus five per cent. Municipal

councils borrowing money in this way must make a return to the Provincial Secretary each year on or before the 30th of January, giving full particulars of the work done and stating the names of the borrowers, the property upon which the money has been borrowed, and the names of persons whose application has been refused and the reason for the refusal. The councils may appoint inspectors. If municipalities fail to make their payments within a month of their being due, the rate of interest is raised to 7 per cent and can be levied on the whole ratable property within their boundaries. If any officer pays out money contrary to the provisions of the Act he becomes personally responsible and liable to a penalty of $500, to be recovered with costs by any person who sues for the same. Any warden or councillor wilfully omitting to see that the provisions of the Act are lived up to also becomes personally responsible.

DITCHES AND WATERCOURSES IN NOVA SCOTIA

The Ditches and Water Courses Act of Nova Scotia requires the council of every municipality to appoint an engineer to carry out the provisions of the Act. Unless otherwise ordered by the engineer every owner is required to open and make, deepen or widen, a fair proportion of the ditch or drain to the construction of which he may become a party. If an owner fails to keep his section in proper repair any other interested owner can notify him and he must act upon such notification within 30 days, failing which the engineer must investigate, and, if the complaint is well founded, can have the work done and all the costs assessed to the owner at fault. If the owners cannot agree to the arrangements appeal can be made to the council, and, if the work required passes through the land of more than five owners the council may instruct the engineer to proceed with the work and assess the costs proportionately. No land can be assessed that lies more than fifty rods above the commencement of the ditch or drain or more than fifty rods on either side. The land is to be assessed according to the value of the benefit derived. If the drain or ditch should pass through land that is not in any way advantaged then that land is not to be assessed, but the work can be carried on at the expense of those persons interested. Owners dissatisfied with the award have the right of appeal to the County Court. The Treasurer of the municipality is authorized to pay the contractor for any work ordered to be done and to collect the same from the objecting or neglecting owners by the same process as for arrears of taxes. The engineer is responsible for the proper carrying out of the work and can give consent to have the ditch or drain covered through the portion of land of any owner requiring it. Extension of the drain can be secured by common consent or by an appeal under the Act. Drains can be carried from one municipality to another on the certificate of the engineer and the municipality of the second part is to collect any arrears in the same manner as the municipality of the first part is authorized under the Act to do. If the council fails to fix the engineer's fees then the engineer can charge and collect his legally authorized fees for such work.

NEW BRUNSWICK'S RECENT ACT

"An Act to Facilitate the Drainage of Farm Lands", was passed by the legislature of New Brunswick at its recent session. The Act is briefly described under the head of "Recent Agricultural Legislation" in the August number of THE GAZETTE.

UNDER THE MUNICIPAL CODE IN QUEBEC

Quebec has passed no farm drainage Act, but special provisions are made in the Municipal Code regarding water-courses, every one of which, with the exception of road and boundary ditches that drain only the two properties between which they are situated, is governed according to Chapter III of the Code. Every non-navigable stream is regarded as a municipal water-course. Work can either be done according to a deed of agreement among the parties interested or the proprietors of the lands drained. Water-courses must be kept in flowing order from May 1st to October 31st. The municipal inspector is responsible for this being done and must assess the cost of any labour required in removing obstacles or repairs against the parties interested. Any person who obstructs a watercourse or permits an obstruction to remain two days from the receipt of a written or verbal notice given by a person interested, incurs a fine of not more than one dollar for every day the obstruction remains. The owner of low or swampy land may make a watercourse through a neighbour's land in accordance with a by-law, by *proces-verbal* or by deed of agreement. The municipal inspector can authorize the opening of any trench or excavation in any public road to allow a water-course to pass through the same and proprietors or occupants whose land is drained by a water-course can be made liable for all costs of the work under a *proces-verbal* or by by-law.

NOTE—The Acts relating to drainage in other provinces will be reviewed in a subsequent issue of THE AGRICULTURAL GAZETTE.

ORGANIZATION FOR MARKETING FRUIT AND VEGETABLES

BY FRED H. GRINDLEY, SECRETARY FRUIT AND VEGETABLE COMMITTEE, OFFICE OF THE FOOD CONTROLLER

AS a temporary arrangement I am devoting a portion of my time to the work of the Food Controller's office as Secretary of the Fruit and Vegetable Committee of which Mr. D. Johnson, Fruit Commissioner; Mr. C. W. Baxter, Chief Fruit Inspector, and Mr. Geo. McIntosh, in charge of Transportation in the Fruit Branch, are members in an advisory capacity. As a result of several sessions of this committee, which consists of representatives from all the fruit-growing provinces, the following facts relative to the apple situation were ascertained:—

1. That a considerable portion of the crop in British Columbia had already been contracted for.

2. That the Ontario crop was very light and scattered, and,

3 That Nova Scotia had a yield above normal.

For these reasons it was considered unwise to set a price to the producer. Several meetings were held in Nova Scotia early in September, and at that time there was some belief that the British embargo would yet be modified to permit the export of a certain portion of the crop. Since then, however, a definite statement has been made by the British Government that the embargo will remain in effect. The situation in Nova Scotia at present is that practically the entire crop is out of the hands of the growers, and prices have been inflated considerably by dealers. The Food Controller is considering steps to be taken to stop speculation, and to prevent undue profits being exacted between the producer and consumer.

An Order in Council has been passed compelling every wholesaler handling apples to register with this office. It is believed that this will help to prevent undue speculation. Accurate records will be kept through the filing of statements from these dealers of their purchases and sales, prices, etc., and in this way it will be possible to keep a close record of their gross profits.

The potato situation has also been taken up. Representatives of the five Eastern provinces were in session here during the week of October 8th, and have recommended, in view of the large surplus, and competition resulting therefrom, not to fix the price of potatoes to the producer. The same system of registration which has been outlined above in the case of apples, will be applied to potatoes. Further than that, reports are being published from the Food Controller's office, twice weekly through the Canadian press, giving the price which growers are receiving for potatoes, and also the wholesale market prices in the leading Canadian cities east of and including Toronto. These give the consumer an idea as to what he should pay for his stock and in a measure assist in the prevention of undue profits.

In Western Canada, the situation is in the hands of Mr. F. M. Black, Chairman of the committee, who is making a close investigation into conditions there.

One of the first steps taken by the committee on its formation, was the organizing of a sub-committee in each of the provinces, with a direct representative on each, so that in the event of provincial problems arising out of the work of the parent committee, these could be immediately placed in the hands of the provincial committee, who could deal with them at close range.

In order to facilitate the movement of the Nova Scotian apple crop, Mr. H. H. Schaefer, who has spent many years in railway work, has been appointed to take charge of transportation work under this committee, with headquarters at Kentville, N.S. Working in co-operation with Mr. Schaefer are Mr. Geo. McIntosh of the Fruit Branch at Ottawa, and Mr. Geo. Spencer, Chief Operating Officer of the Railway Commission. These men will supervise loading, proper distribution and adequate supply of cars, and will endeavour to secure the marketing of the crop with a minimum risk and loss through frost injury or overheating. The co-operation of all the railways who have to do with the movement of the Nova Scotian crop has also been promised.

FARM LOANS IN THE UNITED STATES

IN August, 1916, there came into operation in the United States the Federal Farm Loan Act. At the end of one year, the Act had been put into force in every state and loans to farmers were being approved at the rate of nearly one million dollars a day. Farm loan associations were being chartered at the rate of about twenty-five daily. At the end of the first year the loans applied for exceeded $100,000,000. During the last two and a half months of the first year, more than eight hundred

farm loan associations had been chartered. The greater part of the first year was consumed with the tasks of dividing the country into twelve federal land bank districts according to the farm loan needs of the various sections; the locating of the federal land banks; the sale of the capital stock of the banks; the selection of bank directors and officers; the selection of federal land bank appraisers, and the establishment of a flat interest rate of 5 per cent on farm mortgages in all parts of the United States. The average number of farmer borrowers in each association chartered is eighteen and the loans average about $2,300 in size.

After farm loan associations are chartered it is necessary for the lands of their members to be appraised and abstracts of title provided. More than two hundred federal farm loan appraisers are in the field placing valuations on the lands as rapidly as they can get to them. Approximately $5,000,000 of loans were closed during the first year and the money actually delivered to the farmers.

Under the Act farmers are permitted to borrow for the purpose of land purchase; refunding existing indebtedness; live stock purchase; clearing and draining land; construction of improvements and the purchase of fertilizer and any equipment necessary in the cultivation of the land. The loans are limited to 50 per cent of the appraised value of the land, plus 20 per cent of the appraised value of the permanent insured improvements.

All mortgages under this Act are made on the amortization plan, and run generally for thirty-six years. The farmers make annual payments equal to 6 per cent, five per cent paying interest and 1 per cent being applied on the principal. The 1 per cent applied on the principal annually wipes it out at the end of thirty-six years. The borrower has the right to pay all or any part of the mortgage after it has run five years.

Farmers and prospective farmers may borrow. Land leased to tenants cannot be mortgaged under this act. This cheap capital cannot be used for land speculation and land monopoly, because loans are limited to $10,000 each. This great volume of capital which is being loaned to farmers is procured by the sale of bonds to investors. As banks lend money and take farm mortgages in return they issue bonds against the mortgages and sell the bonds to investors. These bonds bear 4½ per cent and are free of all taxation, being declared by the law "instrumentalities of the government." The bonds of any one federal land bank are endorsed by all of the banks, and consequently all bonds issued have behind them the resources of all of the twelve federal land banks and all of the mortgages representing land appraised at twice the amount of the obligation against it.

NATIONAL SERVICE LEAGUES IN NOVA SCOTIA.

IN the August number of THE AGRICULTURAL GAZETTE there appeared an account of the work of the Ontario Organization of Resources Committee in aiding the conservation, utilization, and organization of the resources of Ontario for the successful prosecution of the war, and the increase and maintenance of agricultural production during the war and thereafter. In Nova Scotia effort along similar lines has been undertaken through the medium of National Service Leagues inaugurated by the Director of National Service, Mr. G. S. Campbell. A report on the work of these organizations says:

> It was decided to form National Service Leagues in each of the provincial towns. The method was to address the Mayor, and place the responsibility of arranging the meeting in his hands. In addition to that letters were frequently addressed to important people of the towns, asking for their co-operation and assistance. The constitution of these leagues is as simple as possible—a local committee representing all classes of the community with power to add to its number—was previously selected and appointed at the meeting. That committee then appointed its own chairman and secretary, to whom literature, etc., were sent. At each meeting, the necessity for acting on its initiative and taking supervision of all local patriotic work was impressed upon the league. While the success of these leagues depends very largely on the personnel of the committees, they have been the means of stimulating patriotic effort in many directions throughout the province. For example, the Halifax league in order to help out small farmers of limited means, bought a considerable quantity of fertilizer and distributed it to the farmers, with the understanding that they were to be repaid either in cash or produce at a stipulated minimum rate. This has not only enabled a number of the farmers to increase their acreage of production, but it has created a feeling of sym-

pathy between the city and the country, which is most desirable. These leagues have also encouraged the cultivation of town lots, and as a result, the gardens and suburban fields have been converted into vegetable plots on a scale never before attempted. In some cases the leagues have organized campaign for the patriotic fund, with the best possible results. Such leagues have been established in Halifax, Amherst, Annapolis Royal, Antigonish, Bridgetown, Bridgewater, Digby, Glace Bay, Inverness, Liverpool, Lockport, Lunenburg, New Glasgow, North Sydney, Pictou, Port Hawkesbury, Port Hood, Shelburne, Shubenacadie, Stellarton, Stewiacke, Sydney, Sydney Mines, Trenton, Truro, Waymouth and Yarmouth. In addition to these, production clubs have been formed by citizens in Dartmouth, Hantsport, Windsor, Wolfville, Kentville and Middleton. There are a few other towns in which National Service Leagues will soon be formed.

Numerous farmers' meetings were held throughout the province, at which farmers were urged to increase production. The local Government has materially helped in this movement by supplying seed, fertilizer, agricultural implements, etc., where these were absolutely necessary. The Halifax Board of Trade has co-operated by giving a number of prizes for the best cultivated small farms in various sections of the province. As a further encouragement a diploma of honour will be given to those farmers who have been especially successful in increasing their output of essential crops. The military authorities have heartily co-operated and have always been willing, when military requirements permitted, to give men temporary leave of absence to work on their farms.

UNITED STATES LIVE STOCK INDUSTRIES COMMISSION

THE United State Department of Agriculture has organized a live stock industries commission. The Government's aims include the following:

"To save a breeding stock of food animals for the future to meet extraordinary demands of the world after the war.

"To adjust present stock-growing conditions to supply to best advantage the meat demands of soldiers and citizens of the United States and soldiers and citizens of America's allies.

"To prepare for demands of other nations for breeding stock now and hereafter.

"To supply the continuing necessity for meat and dairy animals to convert forage and grains not needed for human consumption into meats and dairy products.

"To arrange a redistribution of herds along most productive and economic lines."

An executive committee has been added to the general Live Stock Industries Committee and on this have been appointed Gifford Pinchot of the Food Administration, George M. Rommel and B. H. Rawl of the Department of Agriculture and E. C. Lassater of the Food Administration. Mr. Hoover and Secretary Houston have called upon the state agricultural and food institutions and state councils of defence to co-operate.

It is the business of the committee to further a plan for the transfer of thousands of head of cattle, sheep and hogs from the big western producing districts to small farms in central and southern states. Order for stock can be placed with county agents of the Agricultural Department.

ASSOCIATIONS AND SOCIETIES

THE INTERNATIONAL SOIL-PRODUCTS EXPOSITION

The Twelfth annual congress of The International Soil Products Exposition was held at Peoria, Illinois, on September 18th to 29th. In connection with the congress, the Soil-Products Exposition was held in which Canadian exhibitors won a large number of awards.

At the conclusion of the convention, the executive committee expressed its convictions and desires in the field of agricultural thought.

"We deem it our first duty and privilege to align ourselves squarely with the President, his administration, the army and navy; we pledge the richness of our fields, the wealth of our flocks and, as need comes, the support of our firesides. America must go unafraid, leading, sustaining and binding up wounds as the nations advance into the clear sunlight of democracy and freedom to every man.

"In view of the aggressive action this congress had taken to further rural credit and good road legislation, we are glad to recognize the service such enactments have given our people and look forward to the very great development they may effect.

"The congress is pleased to have the association and interchange of ideas with representatives of the various foreign nations represented at the congress and invite their participation in future years.

"As a congress we are gratified to note the comprehensive character of the Soil-Products Exposition and the splendid exhibits at this greatest agricultural show in the United States. We wish in this manner to express our sincere appreciation to the exhibitors and invite their return with such admirable exhibits or better, next year.

"We wish to renew our allegiance to the principles of crop rotation, the preservation and replenishing of soil fertility by the use of live stock and the principles, which this congress was organized to promote and which have become clearly understood and well established since that time. We will not longer mine the soil but build it into that productive state which will make it a great heritage to our posterity.

"Every movement to further dignify farm labour meets with our approval and we feel that in the extension work among the farmers and housewives, boys and girls, is found one of the most fertile soils and one of the most effective systems at this time. The extension work as carried on by joint effort is most valuable and we would heartily urge its further extension and if it be practical, a more liberal application of rules so as to give it greater opportunity for service.

"During the past season in our grain growing states, the efforts of the Department of Labour secured farm help, which without such effort, would have resulted in very great loss to our farmers. We appreciate this very valuable assistance and wish to encourage the Department in its free employment work and to urge upon Congress an appropriation which will give opportunity for an effective organization of distribution in each state where it is desired. As there is a prospect of increasing shortages of this necessary help, we consider this matter of very great importance.

"Again we wish to advocate the further establishment of consolidated rural schools and the joining together of the rural population and the community interests about the country school and the country church and an increase in the comfort of the farm homes, and the education and inspiration of the farm people. The supreme effort in farm life should be devoted to the rearing of better boys and girls; of those who are imbued with love for the farm home and the soil as associated with the development of the habits of life with spiritual and intellectual growth and patriotism. As one means of this we would recommend the encouragement of agricultural fairs and expositions for their educational influence."

The election of officers resulted as follows: President, Geo. Albert Smith, Salt Lake, Utah; First Vice-President, Frank G. Odell, Omaha, Nebraska; second Vice-president, T. J. Harrison, Winnipeg, Man.; third Vice-President, H. M. Bainer, Topeka, Kansas; Chairman, Board of Governors, W. I. Drummond, Enid, Oklahoma; Secretary, F. J. Wilmarth, Enid, Oklahoma.

PRIZES WON BY CANADIAN EXHIBITORS

Following is a full list of prizes won by exhibitors from Canada:

Best Display of Vegetables by a Nation	Saskatchewan	Third
Best Exhibit by an Individual Farmer	Samuel Larcombe, Birtle, Man.	Third
Hard Red Spring Wheat	Samuel Larcombe	First
Hard Red Spring Wheat	A. Cooper, Treesbank, Man.	Second
Hard Red Spring Wheat	W. J. Corrothers, Methven, Man.	Third
Sweepstakes on wheat	Samuel Larcombe	
White Oats	M. P. Mountain, Solsgirth, Man.	First

White Oats	John W. Lucas, Cayley, Alta	Third
Sweepstakes on Oats	M. P. Mountain	
Two-rowed Barley	Chas. D. Pope, Swan Lake, Man	First
Two-rowed Barley	John W. Lucas	Third
Rye	John Strochaw, Beulah, Man	First
Rye	D. C. Ferguson, Winnipeg	Third
Sweepstakes on Rye	John Strochaw	
Field Peas	Seager Wheeler, Rosthern, Sask	First
Field Peas	Wm. S. Simpson, Vanguard, Sask	Second
Field Peas	John W. Lucas	Third
Sheaf Brome Grass	Seager Wheeler	First
Sheaf Timothy	Bond Brothers, Fenton, Sask	Second
Sheaf Hungarian Millet	R. T. Trischman, Whitemouth, Man	Second
Sheaf Western Rye Grass	Seager Wheeler	First
Brome Grass Seed	Seager Wheeler	Second
Brome Grass Seed	Wm. S. Simpson, Vanguard, Sask	Third
Flax Seed	J. H. Pritchard, Roland, Man	First
Flax Seed	David Pritchard, Roland, Man	Second
Flax Seed	W. C. Simpson, Pambrum, Sask	Third
Western Rye Grass Seed	Seager Wheeler	First
Western Rye Grass Seed	Wm. C. Simpson	Second
Sheaf Hard Red Spring Wheat	Seager Wheeler	First
Sheaf Hard Red Spring Wheat	J. W. Broatch, Moose Jaw, Sask	Second
Sheaf Hard Red Spring Wheat	Andrew Tart, Semans, Sask	Third
Sheaf Oats, any recognized variety	Seager Wheeler	Second
Sheaf Oats, any recognized variety	Samuel Larcombe	Third
Sheaf Two-rowed Barley	Seager Wheeler	First
Sheaf Flax	W. S. Simpson	Third
Sheaf Field Peas	Seager Wheeler	Second
Russett Burbank Potatoes	Aldis W. Cameron, Saskatoon, Sask	First
Russett Burbank Potatoes	Samuel Larcombe	Second
Gold Coin Potatoes	Aldis W. Cameron	Third
Carmen Potatoes	Aldis W. Cameron	Third
Irish Cobbler Potatoes	Seager Wheeler	First
Early Ohio Potatoes	Seager Wheeler	First
Sweepstakes on Potatoes	Seager Wheeler	
Yellow Onions	H. C. Whillians, East Kildonan, Man	Second
Table Beets	Samuel Larcombe	First
Yellow Mangel Wurzel	H. C. Whillians	First
Tomatoes	H. C. Whillians	Third
Cabbage	E. Guest, Indian Head, Sask	First
Carrots	E. Guest	First
Cauliflower	H. C. Whillians	First
Cucumbers	E. Guest	Second
Sugar Beets	H. C. Whillians	First
Garlic	H. C. Whillians	First
Crab Apples	A. R. Stevenson, Morden, Man	Third

DRY-FARM SECTION

Dry Farmed Hard Red Spring Wheat	Jas. S. Fields, Regina, Sask	First
Dry-Farmed Hard Red Spring Wheat	Samuel Larcombe	Second
Dry-Farmed Hard Red Spring Wheat	Robt. W. Clark, Speers, Sask	Third
Sweepstakes Dry-Farmed Wheat	Jas. S. Fields	
Oats	Wm. S. Simpson	First
Oats	John W. Lucas	Second
Oats	W. C. Simpson	Third
Barley	Chas. D. Pope, Swan Lake, Man	First
Barley	Jas. S. Fields	Second
Barley	Wm. S. Simpson	Third
Rye	John W. Lucas	First
Brome Grass Seed	John W. Lucas	First
Brome Grass Seed	Seager Wheeler	Third
Potatoes	Seager Wheeler	First
Potatoes	W. H. Tomalin, Regina, Sask	Second

HAMILTON HORTICULTURAL SOCIETY—PROTECTION OF BIRDS

The Horticultural Society of Hamilton, Ontario, has taken a keen interest in the matter of having the law respecting the preservation of bird life carried out. Whenever the law has been known to be broken in the shooting of robins and other song birds, the attention of the proper officials in the city has been drawn to the matter with the result that a large number of arrests have been made, fines imposed and guns confiscated. Commencing early in the season with a fine of five dollars, the magistrate has recently raised the fine to twenty dollars and confiscation of the firearms possessed by the law breaker.

THE WESTERN CANADA IRRIGATION ASSOCIATION

At the eleventh annual convention of the Western Canada Irrigation Association held at Maple Creek, Saskatchewan, the following officers were elected: President, T. D. Pattullo, Victoria, B.C.; first vice-president, Hon. Hewitt Bostock, Ducks, B.C.; second vice-president, C. R. Marnock, president of the Board of Trade, Lethbridge; acting secretary, J. C. Stead, Calgary; executive committee: chairman, F. H. Auld, Regina, Sask.; R. G. Williamson, Maple Creek, Sask.; Jas. L. Brown, Kamloops, B.C.; Jas. Johnstone, Nelson, B.C.; F. H. Peters, Calgary; A. S. Dawson, Calgary; W. E. Scott, Victoria, B.C.; and F. E. R. Wollaston, Vernon, B.C.

The convention was addressed by representatives of the Departments of Agriculture of Saskatchewan, Alberta and British Columbia, the Dominion Departments of Agriculture and Interior, on such topics as the growing of farm crops by irrigation.

Among the resolutions passed were those recommending the reforestation of the Cypress Hills forest reserve for the purpose of regulating the stream flow in the territory affected; the uninterrupted gauging of streams of water supply; the prevention of pollution of waters in irrigation ditches and the indorsation of the principle of inter-provincial co-operation between western provinces in the consumption of home products.

THE WESTERN CANADA LIVE STOCK UNION

The fifth annual convention of the Western Canada Live Stock Union will be held at Regina, Nov. 14th and 15th. Each organization affiliated with the Union is entitled to one representative, in addition to its secretary. The Western provincial ministers of agriculture, deputy ministers of agriculture and live stock commissioners are among the directors of the Union, as are also the representatives having charge of agricultural and live stock development in Western Canada for the three cross-country railways. In addition to the breeding and other agricultural organizations that were previously members, the United Wool Growers' Association and the Alberta Agricultural Fairs' Association have affiliated with the Union.

His Honour, Lieut. Governor Lake and Premier Martin of the Province of Saskatchewan have accepted invitations to be present at the meeting. Invitations to be present have also been extended to the Dominion Minister of Agriculture, the Hon. John Oliver, Hon. Duncan Marshall, Hon. W. R. Motherwell, Hon. Valentine Winkler, Ministers of Agriculture respectively for British Columbia, Alberta, Saskatchewan and Manitoba; Mr. H. S. Arkell, Acting Dominion Live Stock Commissioner; Dr. F. Torrance, Veterinary Director General for Canada; Mr. Dan Johnson, Dominion Live Stock Representative, Winnipeg; Dr. S. F. Tolmie, Victoria, and Mr. W. A. Wilson, Secretary, Saskatchewan Live Stock Commission. Mr. E. L. Richardson, Calgary, is secretary of the Union and Dr. J. G. Rutherford is president.

NEW BRUNSWICK AGRICULTURAL SOCIETIES UNITED

The annual meeting of the New Brunswick Agricultural Societies United will be held in St. John, November 22nd. This association will purchase co-operatively from seventy-five thousand to one hundred thousand dollars' worth of fertilizing materials for next season's crops. The Secretary is Stanley Wilson, Woodstock, N.B.

POMOLOGICAL AND FRUIT GROWING SOCIETY OF QUEBEC

The annual meeting of the Pomological and Fruit Growing Society of Quebec, will be held at Macdonald College on December 4th and 5th. The speakers will include representatives of the Departments of Agriculture of Nova Scotia, New Brunswick, Quebec and Macdonald College. A fruit show will be held in connection with the meeting. The secretary of the society is Peter Reid, Chateauguay Basin, Quebec.

THE ENTOMOLOGICAL SOCIETY OF CANADA

The annual meeting of the Entomological Society of Ontario will be held at Macdonald College, Sainte Anne de Bellevue, Que., on November the 8th and 9th. The secretary of the association is Mr. A. W. Baker, Ontario Agricultural College, Guelph, Ontario.

THE ONTARIO PROVINCIAL WINTER FAIR

The Ontario Provincial Winter Fair will be held as usual this year at Guelph. The date will be November 30th to December 6th. The Fair will comprise horses, beef cattle, dairy cattle, including the milking test; sheep; swine; poultry; eggs and seed. A number of new features have been introduced in the prize list this year. Among these might be mentioned the Ontario Horse Breeders' Special, a first prize of $6 and a second of $4, to be awarded to the Ontario breeders of winning animals in every horse class; an addition to class 25, grades and crosses of any breed of beef cattle, of $70 divided into four prizes for heifers, barren, 3 year olds, and an increase of the prizes in the other sections in lieu of the money formerly given to junior and senior yearling heifers and calf heifers; the addition of lustre to the fleece wool (domestic) class and an increase of the money given as premiums from $60 divided into 15 prizes to $144 divided into 32 or 8 prizes for each section; the addition of class 90 for pair of bacon hogs, open to farmers' sons taking part in the feeding-hogs-for-profit competitions, $70 divided into 6 prizes; the extension of class 349, eggs fresh gathered, to include No. 1 pullets in half dozen and dozen lots, and an entirely new egg-laying contest for $87 divided into 10 prizes, the rules for which are given in the prize list and which provide that the eggs must be laid during the six days of the fair commencing Friday, Nov. 30, and ending Wednesday, Dec. 5.

ONTARIO DAIRY CONVENTIONS

The Dairymen's Associations of Eastern and Western Ontario will hold their annual conventions, respectively, at Perth on January 10th to 11th, and at Stratford on January 16th to 17th. There will be held at each convention the winter dairy exhibition of cheese and butter. At the Eastern convention the exhibition will consist of cheese made from September 5th to September 30th; cheese made from October 15th to 31st; flat and Stilton cheese made from September 15th to 30th; creamery butter made from November 1st to 15th and dairy butter made within the same period. In each of the cheese classes substantial money prizes will be divided according to the scores made and awarded to the exhibitors whose cheese scores 95 points and upwards. In the creamery butter class the same method of distribution of prizes will be made to the exhibitors scoring 94 points and upwards. In the dairy butter section, first, second, third and fourth prizes will be awarded without respect to the points won. All the exhibits become the property of the Association. At the conclusion of the show these will be sold by public auction and the money paid to the exhibitors. The secretary of the association is Mr. T. A. Thompson, Almonte, Ont. The prize list for the Western exhibition is practically the same, with the exception that no dairy butter is provided for at Stratford. A large number of specials are provided in each class. The secretary of the Western Ontario Dairymen's Association is Mr. Frank Herns, London, Ont.

WOMEN'S INSTITUTES OF ONTARIO

Conventions of the Women's Institutes of Ontario will be held at Ottawa, November 7 and 8; London, November 14 and 15, and Toronto, November 21, 22 and 23. In addition to the presentation and discussion of district reports and other internal business, the subjects of "Patriotic Work," "War Service," "Food Conservation" will be dealt with in addresses and discussions.

SASKATCHEWAN LIVE STOCK ASSOCIATION

AUCTION SALES OF CATTLE, SHEEP AND SWINE

The seventh annual sheep and swine sales under the auspices of the Saskatchewan Live Stock association will be held in connection with the winter fairs in Regina and Saskatoon on November 30th and December 6th respectively. Besides the sheep and swine sales, there will also be an auction of pure-bred and grade female cattle under the auspices of the Cattle Breeders' Association. This fall sale is for females only and the bull sale will be held as usual in March next year. All cows four years old and over must have produced a calf or calved in 1916 or 1917 to be eligible for entry, and no cows over eight years old will be accepted.

ONTARIO BEE-KEEPERS' ASSOCIATION

The annual convention of the Ontario Bee-keepers' Association will be held at Hotel Carls-Rite, Toronto, on December 11th, 12th and 13th. The secretary of the association is Mr. Morley Pettit, St. George, Ontario.

DISTRICT CONVENTIONS OF THE SASKATCHEWAN GRAIN GROWERS ASSOCIATION

At a meeting of the executive of the Saskatchewan Grain Growers' Association the following schedule was arranged for district meetings:

District.	Place held.	First Day.
No. 3	Estevan	Nov. 7th.
No. 2	Viceroy	Nov. 6th.
No. 15	Shaunavon	Nov. 8th.
No. 14	Swift Current	Nov. 13th.
No. 7	Balcarres	Nov. 15th.
No. 4	Regina	Nov. 20th.
No. 1	Moose Jaw	Nov. 27th.
No. 9	Yorkton	Nov. 30th.
No. 16	Rosetown	Dec. 4th.
No. 11	North Battleford	Dec. 4th
No. 10	Humboldt	Dec. 6th.
No. 6	Saskatoon	Dec. 11th.
No. 12	Prince Albert	Dec. 13th.
No. 13	Unity	Dec. 18th.
No. 8	Regina	Dec. 19th.
No. 5	Wolseley	Dec. 19th.

Many of these meetings will also hold over during the following day.

SASKATCHEWAN SWINE BREEDERS' ASSOCIATION

At the Saskatchewan Winter Fair to be held at Regina on November 27th to 30th there will be a swine feeding competition for boys and girls between the ages of ten and fifteen years, residents of the province. Each competitor is required to exhibit one pig, pure bred or grade, between the ages of five and eight months that was fed and cared for by the exhibitor for at least three months immediately previous to the opening of the fair. The exhibits will be judged from a butcher's standpoint. The Saskatchewan Swine Breeders' Association will pay the transportation charge of individual exhibits from the exhibitor's station to Regina, and will, in the absence of the exhibitor, provide free feed and attendance and will exhibit the entry. Fifteen prizes are provided, ranging from $4 to $30. The secretary of the Swine Breeders' Association is Mr. P. P. Bredt, Acting Live Stock Commissioner, Department of Agriculture, Regina.

THE SASKATCHEWAN WINTER FAIR

The Saskatchewan Winter Fair will be held at Regina on November 27th to 30th. The secretary is Mr. D. F. Elderkin.

THE ALBERTA WINTER FAIR

The Alberta Winter Fair will be held at Calgary on December 11th to 14th. During the fair, the live stock associations of the province will hold auction sales of pure bred and grade beef cattle and horses. The secretary is Mr. E. L. Richardson.

THE UNITED FARMERS OF ALBERTA

The 10th annual convention of the United Farmers of Alberta will be held in Calgary on January 22nd to 25th, 1918. The secretary is Mr. P. P. Woodbridge, Calgary.

BABY BEEF COMPETITION FOR BOYS AND GIRLS AT THE ALBERTA WINTER FAIR

DECEMBER 11 to 14 are the dates set for holding the Alberta Winter Fair at Calgary this year. Upwards of $1700.00 in cash and trophies will be distributed in prizes. Features of the fair are auction sales of pure-bred and grade beef females and of pure-bred and grade horses, and also a baby beef competition for boys and girls over nine years of age and under seventeen and for pure-bred or grade steers or heifers calved in 1916. Entries for the sales close November 12th and for the fair December 1st.



GRAND CHALLENGE SHIELD
Baby Beef Competition, Calgary Winter Fair, 1917

BABY BEEF COMPETITION CLASSES

The baby beef competition has been divided into nine classes. Class A is for animals entered by girls; B for animals bred in Alberta and sired by registered Aberdeen Angus bulls; C is for animals sired by registered Aberdeen Angus bulls; D is for animals bred in Alberta sired by registered Hereford bulls; E is for animals sired by registered Hereford bulls; F is for animals bred in Alberta and sired by registered Shorthorn bulls; G is for animals sired by registered Shorthorn bulls; K is for steers calved in 1916, the first prize being $100 and gold medal, the second, $80 and silver medal; the third, $60; fourth, $50; fifth, $45; sixth, $40; seventh, eighth and ninth, each $35, and tenth, $25. Class L is for heifers calved in 1916, the prizes being the same as in Class K. An extra purse of $200 will be added in prizes to class K or L, whichever has the largest number of entries. To each prize in the class ten dollars is to be added and an eleventh, twelfth, thirteenth and fourteenth prize of $25 each created Class M is the sweepstakes class for the best steer or heifer shown in the competition, the prize being a challenge shield valued at $250 to be held by the winner one year. An illustration of the shield is herewith given.

RULES OF THE COMPETITION

The rules for the baby beef competition are as follows:

(1) Open to boys or girls, residents of Canada, over nine years and under seventeen years of age, and for pure bred or grade steers or heifers calved in 1916.

(2) Competitor must have fed, cared for and fitted his entry between Nov. 1st, 1917, and the date of the fair, and must personally exhibit the animal in the show ring when judged or paraded. It is expected this competition will be held at each succeeding Alberta Winter Fair, when longer notice can be given and the exhibitor will be required to feed his entry at least 4 months.

(3) One or more entries may be made from one family or farm by different boys or girls eligible but only one entry may be made in each class by the same person.

(4) In making entry, the name, address and date of birth of competitor must be furnished, the age of the animal, date of birth, name and number of sire and breed if known.

(5) Parents, guardians or employees must certify that the applicant is eligible as to age and has complied with the conditions of the competition No entry will be accepted unless this certificate accompanies it.

(6) The Alberta Winter Fair Committee reserve the right to decide any point not covered by the rules.

ALBERTA DAIRY CONVENTION

The Provincial Dairy Convention for Alberta will be held at Edmonton on January 22nd and 23rd, 1918. The secretary is Mr. C. Marker, Calgary, Dairy Commissioner for Alberta.

BRITISH COLUMBIA VETERINARY ASSOCIATION

The tenth annual meeting of the British Columbia Veterinary Association was held at Penticton on Sept. 21st and 22nd. A number of interesting and instructive paper were read, one on "The Hygienic Value of Goat's Milk" attracting special attention from the prophecy that some day the milk of the goat would displace that of the cow. Resolutions were passed advocating the more thorough inspection of cows and dairies, especially in unorganized districts, stricter application of the tuberculin test and the establishment of communal slaughter houses. Drs. Thomson, Acres, Jarvis and Tolmie were appointed a committee to draw up suggested regulations for municipal or communal slaughter houses. The old officers were re-elected as follows: President, Dr S. F. Tolmie; vice-president, Dr. George Howell; members of council, Drs. J. G. Jervis, W. H. Pickering, W. W. Alton and H. H. George; secretary-treasurer and registrar, Dr. K. Chester.

NEW PUBLICATIONS

THE DOMINION DEPARTMENT OF AGRICULTURE

THE DOMINION EXPERIMENTAL FARMS

Seasonable Hints, No. 9, for November. This periodical of sixteen pages, published once in four months, contains seasonable hints to farmers under the headings of live stock, mixed farming and feeds, field crops, horticulture, poultry, bees, tobacco, botany, field root seeds, cleaning grain for seed and cereals.

THE DIVISION OF ANIMAL HUSBANDRY

Finishing Lambs for the Block, Pamphlet 16. The author Mr. E. S. Archibald, Dominion Animal Husbandman, shows the profits that have been made on the winter finishing of lambs during seven years' experiments. He also gives the rations found most suitable and the equipment necessary for winter feeding.

THE HEALTH OF ANIMALS BRANCH

The report of the Veterinary Director General for the year ending March 31, 1916, is issued. This report covers the work of the branch in its two divisions: (1) For the protection of the health of live stock of Canada, and (2) The work of the Meat and Canned Foods Division.

Bulletin No. 23, *Anthrax*, by Chas. E. Higgins, D.V.S., Pathologist. This pamphlet gives the history, cause and occurrence, as well as the methods of infection, diagnosis and disposition of carcasses infected with anthrax. The pamphlet points out that veterinarians, farmers and others who have reason to suspect the existence of anthrax are compelled, under the Animal Contagious Diseases Act, to promptly notify the Minister of Agriculture, the Veterinary Director-General or the nearest Veterinary Inspector.

LIVE STOCK BRANCH

The Feeding and Housing of Swine is the title of Pamphlet No. 22. This publication is prepared by Professor G. E. Day in charge of the Bacon Production Campaign for the Dominion Government in correlation with Mr. E. S. Archibald, Dominion Animal Husbandman, and Mr. G. R. Rothwell, Assistant Dominion Animal Husbandman. This pamphlet is designed as a hand book for ready reference for farmers in assisting them to manage to the greatest possible advantage the small herd of sows and market pigs which should be maintained on the average farm.

THE PROVINCIAL DEPARTMENTS OF AGRICULTURE

ONTARIO

War Breads. This publication, designated Bulletin No. 254 of the Ontario Department of Agriculture, is issued by the Women's Institutes Division. It consists largely of recipes of breads, biscuits and gems, etc., in which meals other than white flour are used. It also contains an announcement of demonstration lecture courses to be held by the Women's Institutes during the coming fall and winter.

Bulletin No. 253, Dairy Cattle. This bulletin, prepared by Professor A. Leitch, H. M. King and J. P. Sackville, members of the staff of the Ontario Agricultural College, deals with the economy of dairy farming, the breeds of dairy cattle kept in Ontario and a general treatment of the subject covering breeding, feeding, housing and the health of dairy cattle.

Report of Women's Institutes, 1916, Part I. This report of Geo. A. Putnam, Director of Institutes for Ontario, contains a statistical table of the Ontario Women's Institutes for the year 1915-16 and reports of the conventions held in Ottawa, London

and Toronto. The report also contains a section devoted to rations for war time.

Report of the Stallion enrolment Board, 1917. The stallion enrolment year ends on July 31st. This report contains, in addition to the Ontario Enrolment Act, the regulations under it, lists of recognized books of records, summary of the enrolment by counties for the years 1913-17, inspection routes to the fall of 1917 and other information of value to stallion owners.

MANITOBA

The Farmers' Library: Bulletin Nos. 15, 16 and 17 of this series, published in connection with the Extension Service of the Manitoba Agricultural College, which have just been issued, comprise "Poultry Houses for Farm and Town", by M. C. Herrer, B.S.A., Professor of Poultry Husbandry; "Cookery Recipes", by Miss Elizabeth Crawford, Cookery Demonstrator, and "Vegetable Storage", by F. W. Brodrick, B.S.A., Professor of Horticulture and Forestry, and L. J. Smith, B.S.A., Professor of Agricultural Engineering. They a e bulletins of 40, 53 and 12 pages respectively, and are illustrated with halftone cuts and diagrams.

SASKATCHEWAN

Live Stock Commissioner's Report. The fifth annual report of the Live Stock Commissioner for Saskatchewan covers the year ending April 30, 1917, and makes a book of 62 pages. After a thorough review of the live stock situation and prospects, the report chronicles the activities of the various provincial breeding associations, the veterinary association and the winter fair board and records the working of the different legislative Acts affecting live stock.

BRITISH COLUMBIA

The Eleventh Annual Report of the British Columbia Dairymen's Association. This publication constitutes a report of the annual convention of the British Columbia Dairymen's Association held in January, 1917. It also contains reports of cow-testing associations, milk and cream competitions, milk producers competitions, butter competitions and the constitution and by-laws of the Association.

MISCELLANEOUS

Flax Convention. This pamphlet consists of the proceedings of the convention of Canadian flax growers, held at London, Ontario, last spring. At this meeting the flax industry of Canada was fully discussed from the standpoint of the past and the future. A part of the convention was taken up with the annual meeting of the Canadian Flax Growers Association, of which G. G. Bramhill, B.S.A., Chief of the Fibre Division of the Experimental Farms, is the secretary.

The Holstein-Friesian Association for Canada. The Canadian Holstein-Friesian book contains a list of all official and semi-official butter and milk records which have been admitted to the Record of Merit and Record of Performance, together with a list of all record cows under their sires and under their dams with the proven sons of such sires and dams, also the highest record cows in each division. The secretary of the association is W. A. Clemons, St. George, Ont.

A preliminary list of the insects of the province of Quebec—Part III—of the series issued as a supplement to the report of the Quebec Society for the Protection of Plants. The insects included in the list are of the Coleoptera Order, Parts I and II preceding it, dealt with the Lepidoptera and Diptera respectively. In his introductory note, Professor W. Lochhead, President of the Quebec Society for the Protection of Plants, states that other parts will follow as soon as they are prepared.

Canadian Food Bulletin. The Food Controller has commenced the publication of the "Canadian Food Bulletin", the first number of which is dated October 6th and the key note "Produce—Conserve—Substitute". It is published for the information of official organizations co-operating in the work of food control and all other bodies or individuals interested. It will be issued as a means of keeping the provincial committees in touch with the operations of the central office and will provide practical reports on the progress of the work of the provincial committees. This number contains, in addition to items of official information, an article by the food controller on "The Cost of Lower Prices", a statement of Mr. Hoover's policy and reports of provincial bodies.

NOTES

In 1908 there were 6,898,451 sheep in South Australia; in 1915 there were 3,674,547, a decrease of 3,223,904, or over 53 per cent.

In consequence of drought in certain parts of Texas, the United States government has been assisting in the removal of cattle from that state to points in the southeastern states.

In 1912 Manitoba had not enough butter to supply the needs of the province. In 1916 there were shipped out of the province after supplying the domestic demand, 70 car-loads of butter.

The directors of the Thunder Bay Co-operative Marketing Association will market this year's potato crop through the association. A manager has been engaged to work on a commission basis of four per cent.

In Grenville county, Ontario, five of the tractors supplied by the Department of Agriculture have been operated from sixteen to nineteen hours per day. Dashboard lanterns were used on most of the machines.

An extensive woman farmer in Middlesex county, Ontario, has donated a cup to be given for the best school garden in the township in which she resides. The cup will have to be won three years before becoming the property of the winning school.

At the Dominion wool storage warehouse in Toronto on October 18th, 20,000 lb. of Alberta wool were sold at 66 1-16c. per lb. and a few days later 12,000 lb. were sold at 68c. per lb. Up to that date over 830,000 lb. of wool had been disposed of at the warehouse and 200,000 lb. of western wool was on hand.

Mr. W. P. Macdonald, District Representative for Lambton county, Ontario, reports that advantage is being taken by farmers in that county of the freight rebates on feeding steers and breeding heifers. Twenty cars of cattle have already been secured from Winnipeg in this way.

To demonstrate the value of underdraining Mr. R. H. Clemens, District Representative for Wellington county, Ontario, has placed two sheaves of grain in his office window, one taken from a piece of undrained land and the other from a corresponding piece of land in the same field that had been drained in a drainage demonstration conducted by the department of Physics of the Ontario Agricultural College.

Mr. H. S. Dorrance, District Representative for Dufferin county, reports the results of some drainage work carried out on a farm near Orangeville. Last year, previous to draining, the crop of eleven acres was handled in two loads. This year, the same area required one hundred pounds of twine to bind the crop, which amounted to about fifty loads.

In the county of Elgin, Ontario, the District Representative organized an automobile excursion from the eastern to the western part of the county. One hundred automobiles, led by the officers of the Board of Agriculture, made the tour, stopping at some of the prominent homes and other places of interest. A visit was made to a farm on which a tractor, supplied by the Department of Agriculture, was in operation.

The Director of the Extension Department of the Saskatchewan College of Agriculture has addressed a circular to the presidents and secretaries of agricultural societies, pointing out that hereafter agricultural societies that allow fakirs, wheels of fortune and other questionable attractions to operate at their agricultural fairs, will be deprived of the support that they have been receiving fron the Department of Agriculture.

Mr. Wm. E. Scott, Deputy Minister of Agriculture for British Columbia, as Chairman of the British Columbia committee organized to secure contributions on behalf of the British Empire Agricultural Relief to the Allies Fund, has issued strong appeals to the Farmers' Institutes and Women's Institutes of British Columbia. The appeals are addressed to the secretaries, who are asked to call special meetings of the members to deal with the matter.

The Dairy Recorder at Scotsburn, N.S., Mr. H. R. Brown, has prepared a series of six lessons for use in the public schools that he terms "Five Minute Talks on Dairy Subjects." The Director of Rural Science for the Province, Mr. L. A. DeWolfe, says of them, "They combine good history, geography, arithmetic and agriculture in a way that is simple yet striking." The following sample of the questions that accompany Lesson 4 will indicate the character and suggestive value of the series:—

Q. 1—The average cow in Nova Scotia gives 3,300 lb. of milk in a year.

(*a*) Suppose that in 100 lb. of her milk there are 5 lb. of fat. How much fat will she produce in a year?

(*b*) How much fat will she produce in a year if there are only 3 lb. of fat in 100 lb. of milk?

(*c*) With butter fat at 35 cents a lb. how much difference would there be in the value of her milk at 3 per cent or 5 per cent fat?

INDEX TO PERIODICAL LITERATURE

The Canadian Horticulturist and Bee-Keeper Toronto, Oct., 1917.

The McIntosh and Fameuse in Quebec, Prof. T. G. Bunting, Macdonald College, page 269.

British Columbia Fruit & Farm, Vancouver, Oct. 1917.

The Problem of Country Life. Dean Klinck Traces Growth of Agriculture Through History, page 5.

The Eradication of Weeds. How to Overcome the Field Pests of the Farm, John Adams, M.S., Assistant Dominion Botanist, page 14.

The Canadian Poultry Review, Toronto, Oct., 1917

Poultry Houses for Farm and Town, M. C. Herner, B.S.A., Professor of Poultry Husbandry Manitoba Agricultural College, Winnipeg, page 408.

The Canadian Thresherman and Farmer, Winnipeg, Man.

The College is the Community Builder. What Manitoba Agricultural College is doing for Western Canada, page 5.

Farm and Ranch Review, Calgary, Alta., Sept. 30, 1917.

Vealing Calves vs. Beef Production, page 821.

Co-operative Egg Marketing in France T. A. Benson, Edmonton, Dominion Poultry Representative for Alberta, page 822.

Oct. 5—Seed Selection and Breeding, G. H. Cutler, Professor of Cereal Husbandry, University of Alberta, Edmonton, Alta., page 870.

Sheep in Western Canada. Address by A. A. Dowell, Professor of Animal Husbandry, University of Alberta, Edmonton, at Western Canada Irrigation Convention, Maple Creek, page 873.

Oct. 20th—Breeding the Farm Flock, W. H. Tisdale, page 919.

The Nor'-West Farmer, Winnipeg, Man., Oct. 5, 1917.

Home Canning of Surplus Vegetables, Mrs. Rutter, University of Saskatchewan, page 1074.

The Canadian Countryman, Toronto, Ont., Sept. 29, 1917.

Plan Now for Winter Feeding, Daniel McKee, B.S.A., page 1212.

Oct. 13—Should a Dairy Farmer Specialize, H. H. Dean, page 2.

Oct. 20—Cheese at 21¾ Cents—Has it been Enough, H. H. Dean, page 1297.

Farm and Dairy and Rural Home, Toronto, Sept. 27, 1917.

Best Feeds for Alberta Dairy Cows. Suggestions for the Dairyman of the Foothills, S. G. Carlyle, Supt. Demonstration Farm, Edmonton, Alta., page 1041.

Oct. 25th—Practical Poultry Methods at Macdonald Collge—Some Observations Made During a Short Visit with Professor M. A. Jull, page 1136.

Canadian Forestry Journal, Woodstock, Ont., Sept. 1917

What the Woodlet means to the Farm, Roland D. Craig, Commission of Conservation, page 1292.

Educational Review, St. John, N.B. Oct., 1917.

Household Science for High Schools, Kate Thompson Connolly, Walford, Ont., page 96.

Canadian Forestry Journal, Woodstock, Ont., October, 1917.

How New Bird Protection Will Work Out, Dr. C. Gordon Hewitt, Dominion Zoologist, page 1343.

The Farmers' Advocate, London, Ont., October 25th, 1917.

The Value of Mineral Elements in Poultry Feeding, M. A. Jull, page 1660.

Oct. 19—A Vigorous Letter on the Milk Question, H. H. Dean, O. A. C. Guelph, page 1624.

The Farmers' Advocate, Winnipeg, Man., October 24th, 1917.

Wintering Bees in Manitoba, R. M. Muckle, Provincial Apiarist, Manitoba Department of Agriculture, page 1474.

PART V

The International Institute of Agriculture

T. K. Doherty, LL.B., Commissioner

FOREIGN AGRICULTURAL INTELLIGENCE

The Institute is an international clearing house of agricultural information, trade and statistics, a State institution made up of fifty-five adhering countries.

The Canadian Commissioner furnishes the Institute the information needed concerning Canada, and in this connection solicits the active co-operation of all the readers of this section. It is particularly desired that duplicate copies of articles to be published in current periodicals or reports, summarizing results of original research and investigations of universal interest, be sent to the Canadian office for communication to the Institute, to be available for publication in one or other of its three original monthly bulletins. Similarly, duplicate copies of all agricultural reports and writings, whether official or not, are requested for the Rome and Ottawa libraries.

The Canadian Commissioner makes available to Canadians information published by the Institute, for which purpose this section of THE AGRICULTURAL GAZETTE is published monthly. It contains articles and summaries from the original Institute publications. Owing to lack of space many articles are merely indicated, but may be secured upon application to the Commissioner.

Similarly, the Canadian office cheerfully collaborates with anyone desiring to investigate details of foreign agricultural methods and processes, legislation, organization or administration. The Institute library at Ottawa, which has been made as nearly as possible a reproduction of the great International Agricultural Library at the headquarters of the Institute, Rome, now contains about 35,000 books, reports and pamphlets, and a reference catalogue of some 165,000 cards, which includes a complete set of the cards of the U. S. library of Congress referring to agriculture. There are also some 350 periodicals, a great many of which are indexed by the H. W. Wilson Agricultural Index and are consequently easily available for the investigation of current questions. Anyone who may be unable to visit the library in person may write to the Commissioner, who will, if desired, have appropriate bibliographies and memoranda prepared on any given subject.

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

The original Institute Bulletins may be obtained direct from the General Secretary of the International Institute of Agriculture, Rome, Italy. The subscription rates postpaid are as follows:

	Per annum
International Review of Agricultural Economics	18 francs
International Review of the Science and Practice of Agriculture	18 "
International Crop Report and Agricultural Statistics	6 "
The Three Bulletins together	36 "

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION

The International Trade in Feeding Stuffs. —*In the International Review of the Science and Practice of Agriculture*, Year VII, No. 4, pp. 489-551. Rome, April, 1917.

This third *Annual Review* gives the *International Trade in Feeding Stuffs*, up to the end of 1916 as far as the present conditions allow, and according to the scheme established in the second Review. The first two Annual Reviews were given in the April 1915 and April 1916 numbers of the Institute Bulletin.

Two new headings have been introduced: soya and soya-cake, brewing residues; for these are given, under the heading *coefficients*, the factors used to calculate the production of concentrates on the basis of the available supply of raw materials.

Although international events have decreased the trade, as is shown by the figures given, it is fairly clear that the importation of soya into countries using concentrates should regain its hold and thus it will be useful to define in future the extension of this trade. Brewing-residues have become still more important as concentrated foods (including yeast and dried lees) with or without preparation, and it is certain that some countries do not as yet completely utilize these by-products.

As regards colza, the production in India is given, as only the current figures are of importance.

In a new table of the prices of various concentrates are given the rates of various products (rice bran), locust beans, brewers' grains) which at the present time are of more than usual interest.

In the table of prices of various cakes, the rate of sesame and palmnut cake are given together with those of soya, and sunflower cake as quoted on the principal markets.

Appended are a few general remarks on each of the various chapters.

Production.—The new regulations requiring a higher yield of bread-flour from wheat has caused a decreased production of bran in various countries. Similarly in the trade in oil seeds and fruits, a general decrease is observed, resulting in the production of less cake, especially in the importing countries. As regards palmnuts, trade has been so disturbed that the production of palmnut cake has become concentrated in the United Kingdom. A lower yield in sugar-beet by-products is also observable in the countries for which figures are given, because the production of raw material has decreased; from this the United States is excepted as there the growth of sugar-beets has much increased.

Foreign Trade.—Similar effects are seen as in production.

The trade in concentrated foods has almost ceased, due to difficulty of transport and also part to the insufficient production of forage in the exporting countries, especially in South America.

Price.—The lack of supplies on the markets has resulted in a large increase in prices, which is also due to other causes.

Bibliography.—The number of publications that have been examined in the International Institute of Agriculture and which are quoted in the bibliography, amounts to 680 titles, mostly referring to work done in finding new feeding stuffs for supplementing the lack of ordinary forage.

The article in the Institute Bulletin contains a series of tables, extending over thirty-five pages, giving in detail the production, imports, exports and prices of feeding stuffs in the different countries. The feeding stuffs covered include wheat bran, rye bran, rice residues, linseed cakes, cottonseed cakes and meal, colza, groundnuts, sesame, soya, copra, palm kernels, sugarbeet residues, residues from brewing, cereals, etc.

CROPS AND CULTIVATION

The Recent Work at Rothamsted on the Partial Sterilization of the Soil.—RUSSELL E. J. D.Sc., (Director of the Rothamsted Experiment Station), in *The International Review of the Science and Practice of Agriculture*, Year VIII, No. 5, pp. 673-681. Rome, May, 1917.

The investigations which I propose to describe began in the first instance as the result of an accident. In virtue of its large population, soil absorbs a considerable quantity of oxygen and evolves a corresponding amount of carbon dioxide. An experiment had been arranged to demonstrate the well-known fact that soil heated to 130° C., and therefore completely devoid of micro-organisms, lost much of its power of absorbing oxygen. By an accident, the autoclave was not available and the soil was only heated in a steam oven, and it gave the remarkable result that its power of absorbing oxygen, instead of falling, as was anticipated, considerably increased. Now, the steam oven did not kill all the

organisms, but spared those capable of forming spores, i.e. sterilisation was only partial.

Partial sterilization by means of volatile antiseptics gave the same result. The conclusion was drawn that partial sterilization increased the bacterial activity, and consequently the amount of decomposition. The increased quantity of plant food thus formed is shown by the amounts taken up by the plant. Table I contains a typical series of results:

TABLE I.—*Weight and Composition of Crops grown on Partially Sterilized Soils*

	Dry Weight	Percentage Composition of Dry Matter			Weight of Food taken by the Plant from Soil, gms.		
	Grams	N	P2O5	K2O	N	P2O5	K2O
Buckwheat:							
Untreated Soil	18.14	2.75	1.81	5.62	0.499	0.339	1.019
Soil treated with Carbon Disulphide	23.27	3.15	2.34	5.97	0.733	0.544	1.389
Mustard:							
Untreated Soil	15.88	2.30	1.00	4.20	0.367	0.159	0.668
Heated Soil	24.33	4.43	2.08	5.02	1.077	0.506	1.221

This experiment confirmed the earlier results of OBERLIN and others.

Further investigations led to the following conclusions:

1.—Partial sterilization of soil, i.e. heating to a temperature of 60° C. (140° F.) or more, or treatment for a short time with vapours of antiseptics such as toluene, causes first a fall, than a rise in bacterial numbers. The rise sets in soon after the antiseptic has been removed and the soil conditions are once more favourable for bacterial development; it goes on till the numbers considerably exceed those present in the original soil.

TABLE II.—*Numbers of Bacteria and Amounts of Ammonia production in Partially Sterilized Soils.*

	Number of Organisms of Dry Soil in millions, Gelatin Plate Cultures			Ammonia produced in 9 days, in parts per million of dry soil
	At beginning	After 9 days	Increase during 9 days	
Untreated Soil	6.7	9.8	3.1	0.7
Soil heated to 98	0.0003	6.3	6.3	3.2
Soil treated with Toluene, which was subsequently evaporated	2.6	40.6	38.0	17.1
Soil treated with Toluene, which was left in	2.3	2.6	0.3	5.5

This confirmed the earlier results of HILTNER and STORMER.

2.—Simultaneously there is a marked increase in the rate of accumulation of ammonia. This sets in as soon as the bacterial numbers begin to rise, and the connection between the two quantities is normally so close as to indicate a casual relationship, the increased ammonia production is, therefore, attributed to the increased numbers of bacteria. There is no disappearance of nitrate: the ammonia is formed from organic nitrogen compounds.

3.—The increase in bacterial numbers is the result of improvement in the soil as a medium for bacterial growth and not an improvement in the bacterial flora. Indeed, the new flora *per se* is less able to attain high numbers than the old. This is shown by the fact that the old flora, when reintroduced into partially sterilized soil, attains higher numbers and effects more decomposition than the new flora. Partially sterilized soil plus 0.5 per cent of untreated soil, or an unfiltered aqueous extract of untreated soil, soon contains higher bacterial numbers per gram and accumulates ammonia at a faster rate than partially sterilized soil alone.

4.—The improvement in the soil brought about by partial sterilization is permanent the high bacterial numbers being kept up even for 200 days or more. The improvement, therefore, did not consist in the removal of the products of bacterial activity, because there is much more activity in partially sterilized soil than in untreated soil. Further evidence is afforded by the fact that a second treatment of the soil some months after the first produces little or no effect.

It appears from (3) and (4) that the factor limiting bacterial numbers in ordinary soils is not bacterial, nor is it any product of bacterial activity, nor does it arise spontaneously in soils.

5.—But if some of the untreated soil is introduced into partially sterilized soil, the bacterial numbers, after the initial rise, see (3), begin to fall. The effect is rather variable, but is usually more marked in moist soils that have been well supplied with

TABLE III.—*Effect of Reinfecting Untreated Soil into Partially Sterilized Soil.*

	Gain in Ammonia and Nitrate in 57 days	Number of Bacteria in millions per gram of dry Soil		
		After 20 days	After 38 days	After 61 days
Toluened Soil alone	24.3	28.0	31.8	60.1
Toluened Soil + unsterilized aqueous extract from Untreated Soil	43.7	61.3	45.2	166.6
Toluened Soil + 5% Untreated Soil	20.3	32.0	46.9	48.0

organic manures; e.g. in dunged soils. greenhouse soils, sewage farm soils, etc, Thus the limiting factor can be reintroduced from untreated soils. (Table III).

6.—Evidence of the action of the limiting factor in untreated soils is obtained by studying the effect of temperature on bacterial numbers. Untreated soils were maintained at 10°, 20°, 30° C., (50°, 68°, 86° F.), etc., in a well moistened aerated condition, and periodical counts were made of the numbers of bacteria per gram. Rise in temperature rarely caused any increase in bacterial numbers; sometimes it had no action, and often it caused a fall.

But after the soil was partially sterilized the bacterial numbers showed the normal increase with increasing temperatures. Similar results were obtained by varying the amount of moisture but keeping the temperature constant (20°C.) The bacterial numbers in untreated soils behaved erratically, and tended rather to fall than to rise when the conditions were made more favourable to tropic life; on the other hand, in partially sterilized soil, the bacterial numbers steadily increased with increasing moisture content. Again, when untreated soils are stored in the laboratory or glass house under varying conditions of temperature and of moisture content the bacterial numbers fluctuate erratically; when partially sterilized soils are thus stored the fluctuations are regular.

7.—When the curves obtained in (6) are examined, it becomes evident that the limiting factor in the untreated soils is not the lack of anything (1) but the presence of something active.

8.—This factor, as already shown, is put out of action by antiseptics and by heating the soil to 60°C., (140°F.) and once out of action it does not reappear. Less drastic methods of treatment put it out for a time, but not permanently: e.g., heating to 50°, (122°F), rapid drying at 35°, (95°F.), treatment with organic vapour less toxic than toluene (e.g. hexane), incomplete treatment with toluene. In all these cases the rise induced in the bacterial numbers per gram is less in amount than after toluene treatment, and is not permanent; the factor sets up again. As a general rule, if the nitrifying organisms are killed, the limiting factor is also extinguished; if they are only temporarily suppressed, the factor is also only put out for a time.

9.—The properties of the limiting factor are:

a) It is active and not a lack of something else, see (7).

b) It is not bacterial, see (3) and (4).

c) It is extinguished by heat or poisons, and does not reappear if the treatment has sufficed to kill sensitive and non-spore-forming organisms; it may appear, however, if the treatment has not been sufficient to do this.

d) It can be reintroduced into soils from which it has been permanently extinguished by the addition of a little untreated soil.

e) It develops more slowly than bacteria, and for some time may show little or no effect; then it causes a marked reduction in the numbers of bacteria, and its final effect is out of all proportion to the amount introduced.

f) It is favoured by conditions favourable to trophic life in soil, and finally becomes so active that the bacteria become unduly depressed. This is one of the conditions obtaining in glasshouse "sick soils").

It is difficult to see what agent other than a living organism can fulfil these conditions. Search was therefore made for larger organisms capable of destroying bacteria, and considerable numbers of protozoa were found. The ciliates and amoebae are killed by partial sterilization. Whenever they are killed, the detrimental factor is found to be put out of action, the bacterial numbers rise and maintain a high level. Whenever the detrimental factor is not put out of action, the protozoa are not killed. To these rules we have found no exception. Further, intermediate effects are obtained when a series of organic liquids of varying degrees of toxicity is used in quantities gradually increasing from ineffective up to completely effective doses. The detrimental factor is not completely suppressed but sets up again after a time, so that the rise in bacterial numbers is not sustained. But the parallelism with ciliates and amoebae is still preserved: they are completely killed when the detrimental factor is completely put out of action; they are not completely killed, but only suppressed to a greater or less degree, when the detrimental factor is only partly put out of action.

Now this similarity between the properties of the detrimental factor and the protozoa is not proof that the protozoa constitute the limiting factor, but it affords sufficient presumptive evidence to justify further examination. The obvious test of adding cultures of protozoa to partially sterilized soil was made, but no depression in bacterial numbers was obtained; instead there was sometimes a rise. But in view of the history of investigations on malaria and other protozoan diseases no great significance was attached to this early failure.

At this stage the investigation was divided into two parts:

1.—The study of the soil protozoa.

2.—The effects of the limiting factor on the biochemical processes on the soil.

No attempt had ever been made in any of the above experiments to identify the protozoa, or even to ascertain whether any particular form existed in the soil in the trophic state or as cysts. The variety of forms was considerable, and it soon became evident that a definite protozoological survey of the soil was required.

This was accordingly put in hand. In order to give the survey as permanent a value as possible the investigations were not confined to the narrow issue whether soil protozoa do or do not interfere with soil bacteria, but they were put on the broader and safer lines of ascertaining whether a trophic protozoan fauna normally occurs in the soil, and, if so, how the protozoa live, and what is their relation to other soil inhabitants.

The first experiments were made by GOODEY mainly with ciliates, and indicated that these protozoa were present only as cysts. Subsequent investigations, however, by MARTIN and LEWIN established the following conclusions:

1.—A protozoan fauna in a trophic state normally occurs in soils.

2.—The trophic fauna found in the soil differs from that developing when soil is inoculated into hay infusions: the forms which appear to predominate in the soil do not predominate in the hay infusions, and vice versa, the forms predominating in the hay infusions do not necessarily figure largely in the soil.

3.—The trophic fauna is most readily demonstrated and is therefore presumably most numerous, in moist soils well supplied with organic manures, e.g. in dunged soils, greenhouse soil, sewage "sick" soils, and especially glasshouse "sick" soils.

Two methods were used for demonstrating the existence of the trophic fauna. The simplest is to place some of the soil in a porcelain dish and cover it with a fixative solution delivered through a funnel, the the fixative solution being either picric acid or mercuric chloride dissolved in water till saturation is reached, and then mixed with an equal volume of alcohol. In a short time a film is formed which can be picked up on cover slips and mounted in the usual way: it contains many of the organisms in the form in which they actually existed in the soil. Unfortunately, the method is not completely under control, and sometimes for no apparent reason it fails to work.

The second method is to blow air through a mixture of soil and water contained in a long glass tube (50 cc. long) and allow the bubbles to break against a cover slip coated with agar. Some of the protozoa detach themselves from the soil particles, are caught up in the bubbles, and then adhere to the agar on the slip.

By this method MARTIN and LEWIN found that the dominant forms in a rich cucumber soil were amoebae: one was of the limax type to which they gave the name *Vahlkampfia soli*, one of the lamellipodian type which they called *Amoeba cucumis*, and there were two types of Thecamoebae, a *Euglypha* and a *Trinema*. A garden soil of poorer quality contained a more varied fauna, both of amoebae and thecamoebae, but apparently in smaller numbers. Small monads also were numerous.

Finally, the latest experiments by GOODEY have shown that when this trophic fauna is introduced into partially sterilized soils the bacterial numbers are brought down. The earliest attempts to carry out this experiment failed, as already stated, only one successful experiment by CUNNINGHAM being on record. It was not till GOODEY discovered the conditions for successful inoculation that it could be carried out. GOODEY found that mass cultures of protozoa failed when introduced direct from a culture medium into partially sterilized soils, but succeeded when introduced through the medium of some untreated soil. In these circumstances the protozoa lived, and numbers of bacteria were reduced. The protozoa used in these investigations were amoebae of the limax type, these being the forms common in the soil.

Thus it was shown that these protozoa lead an active life in the soil, and that one result of their activity is to keep down the numbers of bacteria.

The further problem was put in hand of finding out how numerous are the protozoa in the soil, and how this activity varies with the different conditions obtaining in the field. A dilution method is adopted somewhat similar to that used for enumerating the soil bacteria. The investigation is still only in its early stages, but already it is clear that amoebae and flagellates are present in at least tens of thousands per gram of soil, while ciliates can only be found in hundreds. Some of the organ-

isms appear to be new to science, and many of them are of considerable interest.

The other part of the investigation consists in studying the effects of these detrimental organisms on the process of food production in the soil. For this purpose it is not necessary to find what the detrimental organisms are, it is sufficient to divide the soil organisms into two groups in their relations to the processes of food production; a useful group and a detrimental group. The latter are, more generally speaking, more readily killed than the former. Conditions that are harmful to active life in the soil tend, therefore, to reduce their numbers and lead ultimately to an increased activity of the useful bacteria. On the other hand, conditions favourable to active life tend to keep up the detrimental organisms and therefore to reduce the useful bacterial activity. It is thus possible to account for a number of obscure paradoxical effects that have hitherto caused considerable perplexity. It has already been observed by practical men in various countries that certain soil conditions harmful to the growth of organisms were ultimately beneficial to productiveness, such as long continued and severe frosts, long drought (especially if associated with hot weather), sufficient heat, treatment with appropriate dressings of lime, gas lime, carbon disulphide, etc.

Further it has been observed that conditions which are undoubtedly favourable to life, such as the combination of warmth, moisture, and organic manures found in glasshouses, lead to reduced productiveness after a time. This phenomena is spoken of as "sickness" by the practical man.

It is difficult to account for these results on the old view that the useful plant-food making bacteria are the only active micro-organisms in the soil. On the other hand, the new view that detrimental organisms are also present readily explains the observed facts.

The "sickness" that affects the soil of glasshouses run at a high pitch (such as cucumber houses), and less slowly at a lower pitch (such as tomato houses), has been investigated in some detail owing to its great technical importance. It was traced to two causes: an accumulation of various pests, and an abnormal development, especially in cucumber houses, of the factor detrimental to bacteria. The properties of this factor show that it is identical in character with that present in normal soil, and strongly indicate its biological nature. No evidence of a soluble toxin could be obtained. On the other hand some remarkably interesting protozoa and allied organisms have been picked out from these sick soils and described by MARTIN, LEWIN and GOODEY. Finally, it has been shown that the whole trouble can be cured by partial sterilization, and methods suitable for large scale work have been investigated and are now in use in practice. Steam heat at present proves most convenient, but the suitability and detailed effects of lime have been studied by HUTCHINSON and M'LENNAN, and of various antiseptics by BUDDIN.

On the technical side the investigation is being developed with a view to the discovery of cheap methods of partial sterilisation. Speaking generally, this type of work is done much better by practical men on their own holdings than at scientific institutions.

It was of course hopeless to try and interest the farmer in any method of partial sterilisation as the cost would be prohibitive, but it was not difficult to interest some of the market gardeners working under glass. Demonstrations made in their nurseries at once appealed to them, and showed that the results were worth having. In consequence of the many modifications they have introduced, the cost of working has greatly fallen and partial sterilization is now extensively practised both as a cure for sick soils and as a method of killing the soil insect and fungoid pests that cause so much havoc in the industry. A special Experiment Station has been set up in the district where the various problems arising out of the industry can be dealt with. One of these is the full investigation of the various methods of partial sterilization both by chemicals and by heat.

A list of papers on partial sterilization is given at the end of the article in the Institute Bulletin.

404—New Experiments on Soil Sterilization in France.—MIÈGE, M., in *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, Vol. 164, No. 9, pp. 362-265. Paris, February, 26, 1917.

Since 1914, the writer has made new experiments with regard to the fertilising influence and antiseptic value of the sterilization of soils. Great attention should be given to the study of this subject, not only in view of the increased yields which may be expected, but also because the sterilization of the soil greatly decreases the large losses suffered annually from the attacks of epiphytic parasites.

Two sets of experiments were carried out; the first in open fields and in gardens on: potatoes, buckwheat, beans, tomatoes, carrots, leeks; the second under glass and in the open, chiefly on tomatoes, but also on cucumbers and carnations.

The following antiseptics were used during the last two years:—toluene formol, lysol, shale oils, wood charcoal, potassium permanganate, hydrogen peroxide, calcium hypochlorite, sulphur, sulphides, etc. Most of these were applied

before sowing, a few were applied only after sprouting, whereas others were used in the preparation of vegetable mould or composts.

FIRST SERIES OF EXPERIMENTS.—The following results were obtained in clayey loam plots measuring 20 square metres each:

TABLE I.—*Yields (in Kilograms) obtained in the 1st series of experiments.*

Antiseptic Used	Beans	Tomatoes	Carrots	Potatoes	Buckwheat (green)
Toluene	—	—	37.100	13.760	45
Carbon bisulphide	—	—	—	12.880	44
Hydrogen peroxide	—	—	—	12.720	—
Lysol	—	—	42.500	—	—
Formol	—	—	—	12.740	43
Potassium permanganate	0.950	—	—	13.020	—
Copper sulphate	—	—	—	14.120	—
Sulphur	—	—	—	16.920	43
Calcium hypochlorite	1.250	50.500	—	—	46
Wood charcoal	0.900	—	—	12.720	—
Controls	0.550	35.000	14.165	8.440	40

The antiseptics had a marked effect, and their application was accompanied, not only by a notable increase in yield, but also by an undeniable decrease in disease and other injuries of the plants treated.

SECOND SERIES OF EXPERIMENTS.—These trials all gave similar results. They were carried out on more than 600 square metres of cultures under glass and more than 1 hectare in the open. These experiments were therefore no longer on a laboratory scale, and as the land was used for commercial purposes to a certain extent, it was necessary that immediate profits be realized.

In these tests, as in the previous ones, the yield was considerably increased and the treatment had a distinctly beneficial effect on the health of the plants. The land and glass-houses used had been devoted to the cultivation of early tomatoes for 15 years. It is obvious that continual intensive cultivation in the same warm and damp surroundings would make the vegetables particularly subject to all diseases, and indeed, in spite of the greatest care and attention, the plants were so infested with parasites, that growth was very seriously compromised and successful cultivation very uncertain. In this case, therefore, peculiar interest was attached to the sterilization of the soil.

The variety of plant used was more especially the "Joffre", a type with firm, smooth fruit. The control plots were between the experimental plots, and all were submitted to identical conditions of development. Table II gives the results per glass-house and per hectare (each glass-house had an area of 400 square metres and contained 1600 plants).

TABLE II.—*Yield per Glasshouse and per hectare.*

No. of glass-house	Antiseptic used	Amount used (kilograms) per glass house	Amount used (kilograms) per hectare	Yield obtained (kilograms) per glass-house	Yield obtained (kilograms) per plant	Yield obtained (kilograms) per hectare
1	Toluene	12	300	3.300	2.062	82.500
	Wood charcoal	30	750			
	Carbon bisulphide	10	250			
2	Wood charcoal	30	750	3.040	1.900	76.000
	Lysol (1st month)	1 per cubic metre	—		1.375	55.000
3*	Formol (2nd month)	1 " " "	—	2.200		
	Toluene (2nd month)	1 " " "	—			
4	Wood charcoal (1st month)	10 " " "	—	2.400	1.500	58.000
5	Lysol	5 at 5: 1000	125	2.200	1.375	55.000
6	Calcium hypochlorite	64	1.500	2.500	1.562	62.500
7	Calcium hypochlorite	64	1.500	2.550	1.570	63.750
8†	Copper sulphate	10	250	2.100	1.312	52.500
	Wood charcoal	20	500			
9	Hydrogen peroxide	500 litres at 10: 1000	125	2.200	1.375	55.000
10	Sulphur	10	250	3.000	1.875	75.000
	Calcium hypochlorite	500 litres at 10: 1000	125			
	Wood charcoal	25	625			
11	Potassium permanganate	600 litres at 5: 1000	75	2.450	1.530	61.250
12	Formol	10 litres at 7:1000 per cubic metre	—	2.350	1.470	58.750
13	Sublimated sulphur	20	500	2.150	1.345	53.750
	Wood charcoal	25	625			
14	Naphtol B	5	125	2.800	1.750	70.000
15	Open air	—	—	2.800	1.750	70.000

* In Composts (pot cultures).—† Mixed.

The highest yield was 3,300 kg. per greenhouse, or more than 2 kg. of fruit per plant and 82,500 kg. per ha. These amounts were obtained with toluene or carbon bisulphide. The lowest yields, obtained from copper sulphate, exceeded 2,100 kg. per glasshouse, that is to say they gave an average of 1.31 kg. per plant and 52,000 kg. per ha.

If these results are compared with those obtained the same year at Rennes the following conclusions may be drawn:

1) Soil sterilization carried out under varied conditions (in the open, in glasshouses, in different soils) for different vegetables has been shown to exert a definite favourable influence on the yield as well as on the health and value of the products.

2) To a certain extent this action is specific as regards the nature of the chemical substances used and that of the plants treated with them. For example, toluene, then carbon bisulphide, give the best results for the same plant under the same conditions (Paramé tomatoes, under glass), whereas elsewhere, and on other cultures, hypochlorite, sulphur, etc., were found to have the most active and favourable effect.

These results fully confirm those already obtained by the writer as well as those obtained abroad and give further proof of the beneficial action of the antiseptic treatment of soils.

405—**The Use of Iron in Agriculture.**—MONNIER, A., and KUCZYASKI, L., (Compte rendu de la séance du 5 octobre 1916 de la Société de Physique et d'Histoire naturelle de Genève) in *Archives des Sciences physiques et naturelles*, Year 122, Vol. XLIII, No. 1, pp. 66-68. Geneva, January 15, 1917 (2 pp. in Institute Bulletin).

406—**Researches on the Calcium Compounds in Soils in the United States,**—SHOREY, EDMUND C., FRY, WILLIAM H., and HAZEN, WILLIAM, in *Journal of Agricultural Research*, Vol. VIII, No. 3, pp 57-77. Washington, D.C., January 15, 1917.

407—**Drainage by Dynamite in the United States.**—*The South American Journal and Brazil and River Plate Mail*, Vol. LXXXII, No. 9, p. 181. London, February 24, 1917.

310—**Explorations and Studies of the Beds of Phosphorites in Russia: Report for 1914.**—SAMOILOV, JA. V., prof., in *Reports on Explorations and Studies of Phosphorite Beds*, Vol. VII, pp. 1-25 + 1-591,54 fig. + 8 plates + 17 maps. Moscow 1915. (2 pp. in Institute Bulletin).

413—**The Comparative Action of Ammonium Sulphate, Sodium Nitrate and some Organic Nitrogenous Manures: Pot Manurial Experiments in Russia.**—JAKOUCHKINE, I., in *Annals of the Agricultural Institute of Moscow*, Year 22, Vol. 1, pp. 137-144, Moscow, 1916. (1 page in Institute Bulletin).

416—**A Saponin from Yucca filamentosa.**—CHERNOFF L. H., VIEHOEVER, ARNO, and JOHNS CARL, O., in *The Journal of Biological Chemistry*, Vol. XXVIII, No. 2, pp. 437-443. Baltimore, Md., January, 1917.

417—**A New Sugar Extracted from the Fruit of the Avocado (Persea gratissima).**—I. LA FORCE, F. B., D. Mannoketoheptose a New Sugar from the Avocado in *The Journal of Biological Chemistry*, Vol. XXVIII, No. 2, pp. 511-522. Baltimore, Md., January, 1917.—II. WRIGHT, F. E., Crystallographic and Optic Properties of Mannoketoheptose and of the Osazones of Mannoketoheptose and Mannoaldoheptose, *Ibid.*, pp. 523-526, 2, fig.

418—**The Part Played by Oxidases in the Improvement of Cultivated Plants; Biological Experiments and Considerations.**—DEGLI ATTI, M., in *Annali della R. Scuola Superiore di Agricoltura di Portici*, Vol. XIV (Reprint), Portici, 1917. (2 pp. in Institute Bulletin).

313—**Development of the Root System of Cirsium arvense and Medicago sativa with Reference to Their Vegetative Reproduction; Observations carried out in Russia.**—PACZOSKIJ J. The biological peculiarities of *Cirsium arvense* Scop., in *Bulletin of Applied Botany*, Year IX, No. 1 (86), pp. 1-16. Petrograd, Jan., 1916.—II. (BERG, F.). Note on certain biological particularities of alfalfa and of *Cirsium arvense* Scop., *Ibid.*, No. 7 (92), pp. 353-357, July, 1916. (3 pp. in Institute Bulletin).

314—**The Chemical Composition of Tobacco during its Vegetative Period. Researches Carried out in Russia.**—KREVS, K., in *Review of Experimental Agriculture dedicated to the Memory of* P. S. KOSSOVITCH, Vol. XVII, Pt. 4, pp. 278-288. Petrograd, 1916. (1 pp. in Institute Bulletin.)

This paper is a preliminary note on the results of experiments which aimed at determining the succession in which substances contained in the ripe tobacco plant accumulate, so as to improve the control in Russian tobacco of the results obtained abroad, and to complete them by more detailed information.

315—**Freezing Point Lowering of the Leaf Sap of the Horticultural Types of Persea Americana: Experiments made in America.**—HARRIS ARTHUR J. and POPENOE WILSON, in *Journal of Agricultural Research*, Vol. 7, pp. 261-268. Washington, D.C., 1916. (2 pp. in Institute Bulletin)

The introduction of tropical economic plants into the warmer portions of the

United States, which for the most part are not free from occasional frosts, depends upon the ability of the species to survive transient low temperature. Among the factors to which frost resistance in plants is due, the magnitude of the depression of the freezing point of the cell sap has been suggested as one of importance. The type in which the expressed sap freezes at the highest temperature is the least capable of enduring cold.

From the evidence presented in the paper, it seems highly probable that in the case of tropical perennials, a knowledge of the freezing-point lowering of the sap would be of some service in predicting their ability to withstand cold and in determining the northern limit of their cultivation.

316—**Germination of the Seeds of Lepidium sativum in Solutions of Electrolytes.**—LESAGE, PIERRE, in *Comptes Rendus des Séances de l'Académie des Sciences*, Vol. 164, No. 2, pp. 119-121, Paris, Jan. 8, 1917. (2 pp. in Institute Bulletin).

318—**The Action of Non-Nitrogenous Reserve Substances in Trees.**—ANTEVS, ERNST, in *Arkiv fur Botanik*, Vol. 14, No. 3, pp. 1-23. Stockholm, 1916. (3 pp. in Institute Bulletin).

319—**The Effects of Manganese and Iron on the Growth of Wheat.**—TOTTINGHAM, W. E., and BECK A. J., In The Plant *World*, Vol. 19, No. 12, pp. 359-370, 2 Fig. Baltimore, December, 1916. (2 pp. in Institute Bulletin).

These experiments were carried out for the purpose of studying the antagonism between manganese and iron in the growth of wheat and the effect of manganese and ferric chlorides upon young wheat plants in water cultures: (iron-free Knop's solution with monopotassic phosphate).

As is shown in a table in the Institute Bulletin, manganous chloride in the presence of bi arbonate of sodium, even in small quantities, is injurious both to the roots and the green portions of the plant.

At high concentrations, sodium bicarbonate exercises a distinctly toxic effect, while ferric chloride, contrary to what was observed in the first series of experiments, stimulated the growth of the tops of the plants. This was evidently due to the alkalinity of the nutrient solution.

320—**The Suppression of Characters on Crossing.**—FIFFEN R. H. in *Journal of Genetics*, Vol. 5, No. 4, pp. 225-228. Cambridge, July, 1916. (2 pp. in Institute Bulletin).

420—**New Practical and Scientific Experiments in the Selection of German Wheats Rich in Gluten.**—VON CARON-ELDINGEN, in *Deutsche Landwirtschaftliche Presse*, Year 43, No. 14, pp. 112-114. Berlin, 1916. (2 pp. in Institute Bulletin).

422—**Improvement of Black Oats by Selection and Crossing in Sweden.**—NILSSON-EHLE, H., in *Sveriges Utsadeforenings Tidskrift*, Year XXVI, No. 6, pp. 219-231, 2 fig. Malmoe, 1916. (4 pp. in Institute Bulletin).

This paper gives the results of a series of experiments on selection and hybridisation carried out at Svalof from 1901-1917 in order to improve black oats in Central Sweden.

322—**Strawberry Selection in the United States.**—DARROW GEORGE M. in *The Journal of Heredity*, Vol. VII, No. 12, pp. 531-540, 6 fig. Washington, D.C., December, 1916. (2 pp. in Institute Bulletin).

323—**Pyronia, a Hybrid Between the Pear and Quince.**—TRABUT, L., in *The Journal of Heredity*, Vol. VII, No. 9, pp. 416-419, fig. 2. Washington, D.C., September, 1916.

427—**The Behaviour of "Bolting" Beets.**—MUNERATI, O., and ZAPPAROLI, T. V., in *Le Stazioni Sperimentali Agrarie Italiane*, Vol. 1, Part 1, pp. 5-24. Modena 1917. (3 pp. in Institute Bulletin).

430—**The Importance of the Awns of Native Wheat in Hungary and of Barley in Sweden.**—I. FLEISCHMANN, RUDOLF, The Importance of the Awns in Native Hungarian Wheat, in *Zeitschrift fur Pflanzenzuchtung*, Vol. 4, Pt, 4, pp. 335-346. Berlin, December, 1916.—II. TEDIN, HANS, The Effects of the Removal of the Awns on the Development of Barley Grain, Sweden, in *Sveriges Utsadeforenings Tidskrift*, Year XXVI, Pt. 6, pp. 245-253. Malmoe, 1916. (2 pp. in Institute Bulletin).

325—**Varieties of Hungarian Wheat Selected to Increase the National Production.**—GRABNER EMILE, in *Kostelek*, year 26, No. 41, pp. 1459-1460. Budapest October 7, 1916.

326—**Manitoba Wheat in Italy and France.**—SIGNORINI, M., in *Il Coltivatore*, Year 63, No. 2, pp. 54-59. Casale Monferrato 1916.

The term "Manitoba" wheat includes all the types of wheat from that district. As a rule, amongst wheats from the same district one well-marked variety predominates, thus, amongst the different varieties of "Manitoba" wheat introduced into Italy and France, one in particular stands out. This wheat gives slender, tapering ears, which are only slightly bearded, with pointed glumes of a pinkish colour. The characteristics of this wheat are identical with those of *Red Fife*, which is much used in the north of the United States and in Canada. For this reason VILMORIN proposed to call this variety Fife rouge instead

of giving it the vague name of "Manitoba" *Red Fife* is the most widely used and best known of the spring wheats, especially in Southern America, on account of the favourable climatic and soil conditions. Before advising the use of Manitoba wheat for spring crops in Europe it will, therefore, be necessary to select, cross and study it. Below is a summary of the results obtained hitherto in Italy and France.

ITALY.—STEVANO, who has experimented with more than twenty varieties of wheat from Winnipeg, the capital of Manitoba, claims to have found good types, with small, light, plump grain of medium strength some of which may be recommended. As a rule "Manitoba" wheats ripen at the end of June or the beginning of July. They give a fairly profitable yield, with straw of medium height, stronger than that of "Cologna".

In the province of Caserte, CAMPBELL carried out an experiment which gave good results, and he advises the use of "Manitoba" in the south of Italy, especially when it has not been possible to sow the local variety in good time. Finally, VOLANTI states that, a few years ago, a farmer of Frugarolo (province of Alexandria) obtained a very fine and very abundant spring crop of "Manitoba" wheat, freely manured.

FRANCE:—SCHRIBAUX has set on foot an enquiry amongst the farmers who, in 1916, cultivated "Manitoba" which had been supplied by the Government. Although the crops were very varied, the ears being white, red, bearded or beardless, the opinion of French farmers was, on a whole, favourable. It must not be forgotten that:

1) Manitoba gives good results and a harvest which may exceed 20 cwt. per acre even if sowing is late and the local varieties cannot be successfully cultivated. Sowing must be abundant in order to counteract the limited stooling of the plant. There should be an average of 1½ cwt. per acre.

2) "Manitoba" is strongly resistant to scorching which does so much damage to March wheat, and is also resistant to rust.

3) "Manitoba" is strong, very early, and resists sea-winds.

4) It should not be sown in clay or naturally moist soils as it then gives bad results.

5) As far as possible the soil should be well manured, as a plant which develops rapidly always needs a fertiliser: a large yield may thus be obtained.

327—**Agricultural Procedures for Increasing the Production of Wheat.**—DEVAUX, M., in *Comptes Rendus des Séances de l'Académie des Sciences*, Vol 164, No. 4, pp. 191-193. Paris, January 22, 1917.

In 1915 and 1916, in the neighbourhood of Bordeaux, the author experimented in the production of wheat by DEMTCHINSKY'S method, that is to say, by early thin sowing continua earthing up and the transplantation of the best plants. He cultivated 4 varieties:—Hybride inversable de Vimorin, Rouge de Bordeaux, Bon Fermier, bearded Rieti. He found that all the wheats grew well under the conditions described above and produced an extraordinary number of ears. Red Bordeaux, one of he varieties which stools least, produced, on 6 square metres, 177 plants, at an average of 9.5 culms per plant, or a total of 1687 stems corresponding to an average of 30 per square metre, with 261 culms of which 116 were produced by 6 large plants.

328—**Cereal Experiments in Montana and in Wyoming, United States.**—I. DONALDSON, N. C., Cereal Experiments at the Judith Basin Substation Moccassin, Montana *United States Department of Agriculture Bulletin*, No. 398, 41 pp., 17 fig. Washington, October 12, 1916.—II. JONES, JENKIN W., Cereal Experiments on the Cheyenne Experiment Farm, Archer, Wyoming, in *United States Department of Agriculture Bulletin* No. 430, 39 pp. 12 fig. Washington, D.C., October 18, 1916. (7 pp. in Institute Bulletin).

431—**Wild and Cultivated Fodder Crops of the Bombay Presidency, India.**—I. MANN, HAROLD H., Fodder Crops of Western India, in the *Department of Agriculture, Bombay, Bulletin* No. 77 of 1916, pp. 142, Poona, 1916.—II. BURNS, W., BHIDE, R K., KULKARNI, L. B., and HANMANTE, N. M., Some Wild Fodder Plants of the Bombay Presidency. *Ibid Bulletin*, No. 78 of 1916, pp. 24 + XXXIV plates.

432—**Transplanting Alfalfa.**—HANSEN, N. E., in *Agricultural Experiment Station, South Dakota State College of Agricultural and Mechanic Arts, Department of Horticulture, Bulletin* No. 167, pp. 424-445, fig. 8. Brookings, South Dakota, June, 1916. (2 pp. in Institute Bulletin).

In the spring of 1907, the writer bought small lots of new alfalfas from Siberia and other parts of Russia. As it was very necessary that as large an acreage should be obtained as possible, the alfalfa was planted in rows, and the ground was kept clean and hoed. These transplanted individuals made such tremendous growth, that the writer has continued to work along this line, and in the spring of 1912, he started the machine transplanting of alfalfa

The writer does not advise that alfalfa transplanting should be generally adopted. The method must be worked out slowly by the actual experience of many farmers.

According to the writer, the advantages of the transplanting system are as follows:

1) With an economy of seed, an alfalfa

is obtained which, being strong and vigorous, at once takes possession of the soil and does not suffer, the first year, from the competition of dodder and other weeds.

2) When transplanted in autumn, the alfalfa occupies the ground for one season less. Thus another crop can be obtained in the rotation.

3) Transplanting is a sure manner of insuring inoculation.

4) Plants in hills may be kept cultivated and free from dodder and other weeds, so the seed raised from these plants is absolutely pure (100%).

5) The roots and tops of these isolated plants attain a huge size, and consequently the seed is more abundant, plumper, and heavier and is thus of greater commercial value.

332—**The Cultivation of Potatoes from Potato Skin; Experiments Carried out in Italy.**—CASTALDI, G., in *Societa degla Agricoltori italiani, Bollettino, quindicinale*, Year XXII, No. 3, pp. 44-46. Rome, February 15, 1917.

In the spring of 1916, at S. Angelo of Alifa (Province of Caserta), the author carried out experiments on the cultivation of potatoes by cutting the skin into strips about 2 mm. thick (that is to say, with some of the flesh still adhering to it), with the eyes. From 100 parts by weight of potatoes he obtained 45.5 parts of skin for planting and 54.5 parts which could be used for food or trade purposes. The experiments were carried out on square plots, all of which had been similarly treated as regards the preparation of the soil and manuring.

On the 19th March alternate plots were planted with whole potatoes and skins of the same variety respectively. Identical methods of cultivation were carried out at the same time on all the plots. The harvest was gathered on the 4th August. The vegetation of the different plots was uniform and there was no great difference in the yields. The average yields were as follows;

	Yield from whole potatoes	Yield from skin in strips
Area of each plot	43 sq. yards.	43 sq. yards.
Quantity of material used for planting	120 lbs.	55 lbs.
Potatoes harvested	633 lbs.	619 lbs.

In terms of weight per acre these results show that 5½ cwts. of skin yielded 63½ cwts of potatoes, whereas 12 cwts. of whole potatoes yielded 63¾ cwts.

444—**Influence of Manganese on the Nitrogen Content of Sugar Beets; Experiments in Germany.**—ULRICH K., in *B atter fur Rubenbau*, Year 24, No. 3, pp. 31 33. Berlin, February 15, 1917. (2. pp in Institute Bulletin).

335—**Fruitgrowing in New Zealand.**—LONGTON, J., in *The Fruit World*, Vol. XVII, No. 12, pp. 384, Melbourne, December, 1916.

448—**Statistics of Fruits in the Principal Countries.**—RUDDIMANN, H. D., in *United States Department of Agriculture, Bulletin* No. 483, 40 pp. Washington, D. C., February 14, 1917.

The above-mentioned bulletin presents in a concise form statistics of fruit and fruit products (oil, wine) in the principal producing, exporting and consuming countries.

450—**Apples: Production Estimates and Important Commercial Districts and Varieties.**—GOULD, H. P., and ANDREWS, F., in *United States Department of Agricul ure, Bulletin* No. 485, pp. 1-48. Washington, D.C., January 20, 1917. (2 pp. in Institute Bulletin).

452—**The Yield of Unpruned Vines.**—DALMASSO, G., in *La Rivista di Viticoltura, Enologia ed Agraria*, Year 23, No. 4, pp. 49-50. Conegliano, February 15, 1917.—II. RAVAZ, L., in *Le Progres agricole et viticole*, Year 34, Vol. LXVII, No. 10, pp. 221-224, Montpellier, March 11, 1917. (1 page in Institute Bulletin).

LIVE STOCK AND BREEDING

458—**Auto-Inoculation and Early Development of the Larva of the Horse-Bot (Gastrophilus intestinalis) in the Membranes of the Mouth Cavity.**—ROUBAUD, E., in *Comptes Rendus des Séances de l'Académie des Sciences*, Vol. 164, No. 11, pp. 453-456. Paris, March 12, 1917. (1 page in Institute Bulletin.)

459—**Diagnosis of Tuberculosis (Especially the Bovine Form) by Complement Fixation.**—EICHHORN, A., and BLUMBERG, B., in *Journal of Agricultural Research*, Vol. VIII, No. 1, pp. 1-2. Washington, D.C., January 2, 1917. (3 pp. in Institute Bulletin.)

342—**Contribution to the Knowledge of the Strongylid Syngamus bronchialis in Domestic Poultry.**—FEUREISSEN, W., in *Zeitschrift fur Fleisch-und Milch hygiene*, Year 27, No. 2, pp. 17-22. Berlin, Oct. 15, 1916.

464—**Sound Reasons for Pure Breds.**—SEVERSON, B. O., in *The Field*, Vol. XXVI, No. 8, pp. 670-672. New York, August, 1916.

Although pure-breds offer a greater surety of merit in selection than do scrubs, there are animals amongst them which are not necessarily desirable. The importance of individual merit even for pure-breds may be gathered from the data contained in a table compiled from the Advanced Registry of the Holstein-Friesian breed up to May 15, 1912, which includes 1191 bulls.

From these facts it is apparent that the percentage of bulls having the highest number of Advanced Registry daughters come from parents that were recorded in the Advanced Registry; this is indicated by an increase of from 50 to 100%. Similarly the breeding merit of cows is determined by heredity, as is seen in a table which shows an increase of from 58 to 100% in the number of daughters whose dams were entered in the Advanced Registry. With cows, as with bulls, the most prepotent animals are those whose merit depends upon performance based on heredity.

345—**Statistical Data Relating to the Age of Cattle Used as Breeders in Maine, United States.**—PEARL, RAYMOND, in *Maine Agricultural Experiment Station, Report of Proceedings on Animal Husbandry Investigations in 1915*. No. 519-12-15, pp. 19-22. Orono, Maine.

The age of the animals is an important factor in many problems of cattle breeding.

The effect of age upon the milk production of a cow is well-known, and the profitable limits of age of a cow as a milker can be determined with precision. No principle of genetic science seems to be more solidly grounded than that progeny per formance is the only test of breeding worth. This principle, however, plays no part in the breeding of a herd, if a herd bull is disposed of before any of his progeny have reached an age when their performance as milkers can be measured.

These considerations led the writer to collect from the best-known Maine farmers and breeders the statistical data given in a table in the article in the Institute Bulletin, which is both a birth record and a service record.

The average age of the herd bulls used to sire the 967 calves included in the statistics was just under 3 years. The median age of these herd bulls was approximately 2½ years. This means that 50 per cent of the calves were sired by bulls *under* 2½ years old; 75 per cent of all the calves (as shown by the third quartile age) were sired by bulls less than about 3¾ years at time of service. Less than 15 per cent of the calves were sired by bulls 5, or more, years old.

The importance of this fact cannot escape the attention of breeders. A bull must be at least 3 years old before the breeder can possibly have any opportun ty of testing the milk producing capacity of its progeny, but 58.9 per cent of all the calves figuring in these statistics were sired by bulls under 3 years of age.

More than half of the calves produced in a given interval of time are sired by bulls about whose ability to transmit milking qualities nothing definite can be known. If the same conditions regarding cattle breeding methods obtain in other places generally, it is not remarkable that progress in milch cattle selection is so slow.

In the female part of the herd the selection conditions are better. If we exclude heifers bred for their first ca ves, the average age of the breeding cows is, approximately, 5½ years. This is the age when, on the average, cows are nearly, if not quite, at their best as regards milk production.

Out of 878 calves, 166, or 18.9 per cent, were the first calves of heifers. The average age of these heifers when successfully served for these first calves was about 1 year and 7 months. ¾ of the heifers were served before they were 2.1 years old.

465—**Feeding Experiments of Pure Bred Draft Fillies in Illinois.**—EDMONDS, J. L., in *The Field*, Vol. XXVIII, No. 2, pp. 95-97 and 128. New York, February, 1917. (2 pp. in Institute Bulletin).

347—**The Influence of the Plane of Nutrition of the Cow Upon the Composition and Properties of Milk and Butter Fat; Experiments Carried Out in America.**—I. ECKLES, C. H., and PALMER, L. S., Influence of Over-Feeding, in *University of Missouri, College of Agriculture, Agricultural Experiment Station Research Bulletin* No. 24, 39 pp. 8 + IV Tables, 4 fig. Columbia, Missouri, May, 1916. —II. Influence of Under-Feeding, *Ibidem* No. 25, 107 pp. 26 + XI Tables, 15 fig., November, 1916. (3 pp. in Institute Bulletin).

467—**The Efficiency of Certain Milk Substitutes in Calf Feeding.**—CARR, R. H., SPITZER, G., CALDWELL, R. E., and ANDERSON, O. H., in *The Journal of Biological Chemistry*, Vol. XXVIII, No. 2, pp. 501-509. Baltimore, Md., January, 1917. (2 pp. in Institute Bulletin).

348—**The Value of Silage.**—DORMAN, J. E., in *Hoard's Dairyman*, Vol. LII, No. 23, pp. 800 and 820. Fort Atkinson, Wisconsin, December 29, 1916.

Because there is no market for silage, other than through live stock, there has been much speculation as to what it is really worth as a feed for dairy cows.

Dairymen know in a general way that it is worth all it costs to grow and harvest

it, hence, they continue to build silos and fill them.

Through analysis and comparison with other feeds, silage is placed as only one-fourth as valuable as timothy hay, or $4 per ton when timothy hay is worth $16.

In actual feeding practice silage contains certain other properties that give it value far beyond what the analysis shows.

The dairymen know that their live stock thrive better and that they have less sickness in their herds when silage forms a part of the winter ration.

The figures below indicate that silage does play an important part in keeping up the milk flow, which would, without this succulent feed, continue to decrease. While this experiment is not extensive enough to be conclusive, it does indicate to a certain extent what takes place in many of the herds that are being fed silage, and also indicates, that silage is really worth more than is generally estimated.

Forty cows from a herd of 71 were selected for this test. These cows had freshened prior to September 1st and all continued in full flow of milk through September, October and November.

The results of the test are summarized in the following table:

	Production	
	Milk lbs.	Fat lbs.
September: Pasture, hay in rack, and grain	28.241	929,8
October: Pasture hay in rack, and grain	25.518	843,1
November: Hay and silage	29.028	925,2
Decrease: September to October	2.723	86,7
Assuming like decrease October to November	2.723	86,7
Total decrease without silage would have been	5.446	173,4
November yield with silage was	29.028	925,2
Without silage would have been	22.795	756,4
Total decrease without silage would have been	6.233	168,8

From the above figures, we deduce the following values:

Value of increased butterfat at 27.5c	$46.42
Value of skimmilk at 25c. per cwt	15.58
Total value of increased production	$62.00
Increase to each ton silage fed	3.44
Each ton of ensilage fed replaced:	
330 lb. grain valued at $1 per cwt.	3.30
600 lb. hay valued at $5 per ton.	1.65
Value ton of ensilage	$8.39

The value of both grain and hay has approximately doubled since this experiment was conducted.

349—**Care, Feed and Management of the Dairy Herd in Iowa.**—KILDEE, H. H., in *Sixteenth Annual Iowa Year Book of Agriculture*, pp. 495-532. Des Moines, Iowa, July 1, 1916. (7 pp. in Institute Bulletin.

350—**Ewes' Milk, Its Fat Content and Relation to the Growth of Lambs: Studies Made in the United States.**—RITZMAN, E. G., in *Journal of Agricultural Research*, Vol. VIII, No. 2, pp. 25-29. Washington, January 8, 1917. (3 pp. in Institute Bulletin).

468—**Lamb Feeding in Texas.**—JONES, J. M., in *The Breeders' Gazette*, Vol. LXXI, No. 7, pp. 327-328. Chicago, February 15, 1917. (2 pp. in Institute Bulletin).

469—**Injurious Effect of Palpating Laying Hens in order to Determine the Presence of Eggs.**—KITT, TH., in *Monatshefte fur praktische Tierheilkunde*, Vol. 28, Part 5-6, pp. 256-265.—Stuttgart, Mar. 20, 1917. (2 pp. in Institute Bulletin).

351—**Egg-Laying Record of White Leghorn Pullets.**—HANSON, S. G., in *The Journal of the Board of Agriculture*, Vol. XXIII, No. 10, pp. 997. London, January, 1917.

354—**New Freezing Process for the Preserving of Fish.**—KALLERT, E., in *Zeitschrift fur Fleisch und Milchhygiene*, 26th Year, Part 23, pp. 353-355. Berlin, Sept. 1, 1916. (1 page in Institute Bulletin).

FARM ENGINEERING

473—**The Comparative Costs of Using Agricultural Machinery in the United States and in France.**—RINGELMANN, MAX, in *Journal d'Agriculture pratique*, Year 81, No. 1, pp. 18-20, No. 2, pp. 29-30. Paris, January 11 and 25, 1917. (3 pp. in Institute Bulletin).

474—**The Comparative Cost of Tractor and Horse Power, in the United States.**—MORRISON, F. L., in *Farm Implement News*, Vol. XXXVIII, No. 6, pp. 43-45. Chicago, Feb. 8, 1917.

To show the economic advantages presented by the tractor, the writer has made this comparison between the costs of keeping horses and a tractor of equal power.

The cost of upkeep of a horse varies very widely. Of late years, the expense has continually increased owing to the higher cost of hay, oats, and labour.

According to the official estimates of the United States Agricultural Department, the cost of upkeep of a horse that was about 80 dollars a few years ago, had increased to 98 dollars in 1912 and to 129 in 1914. In 1916, the writer reckons the cost to be 167 dollars. Thus the cost of upkeep of a horse has doubled in the last 15 years; in calculating it, the writer has taken into account the interest on capital, depreciation of the animal and harness, food, attendance and shoeing A ration of 4600 pounds of grain and 6300 pounds of hay per horse per year has been taken as a basis, being figures obtained in an investigation in Minnesota.

On an average 160-acre farm, at least 4 horses are required; the maintenance charge for these horses would be $668.76.

For an 8HP tractor costing $1000, the maintenance charges are:

Interest on investment at 6%	$ 60	
Depreciation and repairs at 20%	200	
20 gallons of kerosene at 7.7 cents per gallon	0.54	per 10 hours work
1 gallon of oil at 35 cents per gallon	0.35	
therefore for 100 working days	189.00	
Labour and miscellaneous expenses (not including driver's wages)	19.87	
Total	468.87	

It is seen that the maintenance of an 8HP tractor costs 200 *dollars* less than that of 4 horses, which cost about 250 dollars each in the United States. Therefore the cost price is the same in both cases.

As regards the comparative cost of a day's work, some official estimates show that a farm horse works from 700 to 1000 hours a year. Taking the most favourable figure, a horse costs 16.7 cents for each hour of work, the annual cost being $167.19.

A 160 acre farm, which is taken as the economical minimum of size for tractor employment, requires 4 horses for the work; therefore the cost per hour of horse labour amounts to 66.8 cents.

The tractor maintained at an expense of $468.87 for the year, also will work 1000 hours, at a cost of 46.8 cents per hour, or as it is 8HP, it will cost per horse power only 5.8 cents. This is an advantage in favour of the tractor of nearly 11 cents per horse power hour. In fixing the rate of depreciation the writer reckons it at 20% of the cost price, for he thinks that the life of a tractor is very limited, whilst he values the depreciation in value of the horses at only 10%.

357—The Dowling Plough.—*Scientific American*, Vol. CXVI, No. 2, p. 68. New York, Jan. 13, 1917.

This plough invented by J. DOWLING, Powell, Wyoming, U.S.A., has a pair of ploughshares placed back to back on the plough standard and a beam adapted to be turned through an angle to present either of the said ploughshares at the front. The ploughshares are separately mounted on the plough standard for vertical sliding movement and there are means for simultaneously sliding the ploughshares in opposite direction to raise either share and depress the other to working position on the standard.

475—The Ransome Three-Row Ridger.—*The Implement and Machinery Review*, Vol. 42, No. 503, p. 1238 + 1 fig. London, March 1, 1917.

MESSRS. RANSOMES, SIMS & JEFFRIES, of Ipswich, produce a three-row ridger for potato growers who do not favour the use of a combined cultivator and ridger.

358—Bates-Joliet Tractor with Extensible Steering.—FREMIER, VICTOR, in *Le Génie Rural*, Year 8, New Series No.6 (No. 66), p. 10, 3 fig. Paris, 1916.

The JOLIET OIL TRACTOR COMPANY has fitted an extensible steering wheel in the rear of its tractors, so as to allow the driver to be seated behind the plough or binder and at the same time to drive the tractor and control the implements being hauled.

360—The "Marvel" Potato Digger.—*The Implement and Machinery Review*, Vol. 42, No. 502, p. 1132, 1 fig. London, February 1, 1917.

365—Hygienic Drinking Trough with Separate Compartments. — *Scientific American*, Vol. CXVI, No. 2, p. 66 + 1 fig. New York, Jan. 13, 1917.

To prevent the spread of disease, particularly glanders, among horses, a drinking trough has been invented in the United States which prevents the horses from all drinking in the same water.

The trough contains several basins, just large enough to admit the muzzle of each horse, and in which the water enters from the bottom and flows away over the upper edge. Thus, there is a continuous stream of water which flows away by the waste pipes.

AGRICULTURAL INDUSTRIES

481—**The Potato Starch Industry in Holland.**—GOOSEN, G., in *In-en Uitvoer*, No. 9, pp. 190-192. Amsterdam, Feb., 28, 1917.

482—**The Commercial Use of Saccharose-Inverting Bacteria for the Manufacture of Lactic Acid, Acetic Acid and Acetone.**—MEZZADROLI, G., (Preliminary note), in *Bollettino dell'Associazione delle Industrie dello Zucchero e dell'Alcool*, Year IX, No. 10, pp. 142-145. Bologna, January, 1917. (2 pp. in Institute Bulletin).

369—**Sugar Sorghum and Alcohol in War Time, in France.**—POUZIN, PAUL, in *Journal d'Agriculture pratique*, Year 81, New Series, Vol. 30, No. 4, pp. 67-68. Paris, February 22, 1917.

488—**"Grana" Cheese Attacked by Penicillium Roqueforti at the Cheese Making Station at Lodi, Italy.**—DALLA TORRE, G., in the *Annuario della R. Stazione Sperimentale di Caseificio di Lodi*, Year 1915, pp. 20-22. Lodi, 1916.

372—**General Data on Cheese Manufactured at the Lodi Royal Experimental Station (Italy) during the Year 1915-1916.**—BESANA, C. in *Annuario della R. Stazione Sperimentale di Caseificio di Lodi*, pp. 11-14. Lodi, 1916. (2 pp. in Institute Bulletin).

373—**The Drying of Cereal Grains in Germany.**—STETEFELD RICHARD in *Die Muhle* 53rd Year, No. 45, pp. 739-740, 2 figs. Leipzig, Nov. 10, 1916. (3 pp. in Institute Bulletin).

374—**Recent Data on the Potato Drying Industry in Austria.**—WIRTH in *Wiener Landwirtschaftliche Zeitung*, 67th Year, No. 8, pp. 51-55; No. 9, pp. 59-61. Vienna, 27th and 31st Jan., 1917.

Whereas in Germany the practice of drying potatoes had already acquired great importance before the war, it is only during the course of the same that its value has been realized in Austria. At the present moment this country possesses 80 potato driers, of which 41 were set up in 1916, in 22 new drying establishments.

375—**Use of Flowers of Sulphur for Preserving Potatoes** (1).—*Bulletin de la Société des Agriculteurs de France*, Vol. LXXIX, pp. 10-11. Paris, January, 1917.

The Director of the Agricultural Colony of Lamotte-Beuvron, France, has for a long time past obtained excellent results by dusting potatoes with sulphur in proportion as they are stored in the silo or cellar.

Reddish or pink potatoes lose a little of their colour but retain their germinating faculty and acquire no taste of sulphur. As a result of the heat produced at the beginning of heaping the sulphur becomes transformed into sulphurous anhydride which spreads throughout the silo or store and destroys the latent germs of rot, especially those at the surface of the tubers.

This method is used by the Director with equal success for the preservation of accumulated stocks.

(1) See also Bulletin of Foreign Agricultural Intelligence, Nov., 1915, No. 752.

376—**New Process for Preserving Butter over Long Periods.**—PAUL T., in *Chemiker-Zeitung* Year 41, No. 10, pp. 74-75. Cothen, Jan. 24, 1917. (2 pp. in Institute Bulletin).

The writer already showed some time ago the possibility of preserving butter from deterioration for long periods by proceeding in the following way: separating the fatty matter of the butter from the remaining buttermilk, keeping it in tightly closed recipients and reconverting into butter when required for consumption by treating it with fresh milk. He has now attempted to convert this possiblity into practice and has carried out trials which, having given very satisfactory results, have led to the adoption of methods described in the article in the Institute Bulletin.

PLANT DISEASES

491—**Toxic Chlorosis of Maize. The Internal Secretion and Natural Resistance of Higher Plants to Poisons and to Parasitic Diseases** (1).)MAZÉ, P., in *Comptes rendus des séances de la Société de Biologie*, Vol. LXXIX, No. 19, pp. 1059-1066. Paris, 1916. (3 pp. in Institute Bulletin)

(1) See also Bulletin of Foreign Agricultural Intelligence, June, 1915, No. 226.

381—**Observations on Plant Diseases carried out in 1915 at the Royal Institute of Cryptogamic Botany (Cryptogamic Laboratory) of Pavia, Italy.**—BRIOSI, GIOVANNI, in *Bollettino dei Misteri per l'Agricoltura e per l'Industria, il Commercio ed il Lavoro*, Series B., Year XV, Vol. II, Part 5-8, pp. 17-26. Rome, 1916

497—**Acid and Alkaline Spraying Mixtures.**—HÉRON, G., in *Le Progrès agricole et viticole*, 34th Year, Vol. LXVII, No. 10, pp. 228-230. Montpellier, Mar. 11, 1917.

With reference to a communication by Messrs. VERMOREL and DANTONY to the French Academy of Agriculture on the preparation of copper mixtures for the control of "mildew", whence it appears that acid spraying mixtures are inferior to alkaline mixtures, the writer—President of the Agricultural Syndicate of the Haute-Garonne—states his personal ideas upon this important subject.

Messrs. VERMOREL and DANTONY say that acid or neutral mixtures are carried off by rain and atmospheric agents with extreme rapidity, whilst alkaline mixtures resist much better and remain active for months, giving up after this time a fair quantity of copper to the water of the atmosphere, whence the conclusion that an alkaline mixture with 1% sulphate of copper would be superior to a 2% spray, when it is acid. The writer draws attention to the fact that the acid mixture is a mixture which contains the same quantity of lime per hectolitre, in a copper preparation, as does an alkaline mixture to which is added the quantity of copper necessary to render it acid from the point of view of its physical composition, therefore, it is just as thick.

The writer states that, if the soluble copper is removed by the rain, it would be the same thing from the point of view of the vine as if no excess of copper had been added, consequently the writer is at a loss to understand why this preparation should cease to be active. He states he has obtained good results from acid preparations.

He questions whether the copper, whose disappearance was remarked by Messrs. Vermorel and Dantony had not been partially absorbed by the leaves, thus conferring upon them a certain immunity.

It would be interesting to study this phenomenon and, at the same time, enquire whether it would not be possible to protect vines against fungoid parasites by injecting an immunising solution into the sap.

The writer concludes that: 1) thorough spraying with copper mixtures is more important than ever and that such spraying should extend to all the green portions of the plant; 2) in the present state of our knowledge it would be very dangerous, in a year favourable to "mildew", to reduce the quantity of copper.

498—**Lime-Sulphur Mixtures in the Control of the "Oidium" of the Vine.**—CADORET, ARTHUR, in *Le Progrès agricole et viticole*, 34th Year, Vol. LXVI, No. 11, pp. 258-259. Montpellier, 1917.

503—**Ascochyta sp. the Cause of a Disease of Cabbages, in Germany.**—VASTERS, JOSEF, in *Deutsche landwirtschaftliche Presse*, 43rd Year, No. 35, pp. 308-309. Berlin, 1916.

505—**Diseases and Pests of the Common Spruce (Picea excelsa) in Darnaway Forest, Scotland.**—WATSON, H., in *Transactions of the Royal Scottish Arboricultural Society*, Vol. XXXI, Part 1, pp. 72-73, Edinburg, 1917.

INJURIOUS INSECTS

508—**Observations on the Life History of Agriotes obscurus, Linn.**—FORD, GEORGE H., in *The Annals of Applied Biology*, Vol. III, Nos. 2 and 3, pp. 97-115, 2 plates, Cambridge, January, 1917.

393—**Wolfiella ruforum n. gen. and n. sp., a Chalcid Parasite of the Eggs of Lophyrus rufus in Germany.**—KRAUSSE ANTON, in *Zeitschrift fur Forst und Jagdwesen*, Year 49, Part 1, pp. 26-35. Berlin January, 1917.

394—**The Solubility of the Scale of the Mussel Scale-Insect (Lepidosaphes Ulmi, Linn).**—MAULIK, S., in Bulletin *of Entomological Research*, Vol. 7, Part 3, pp. 267-269, fig. 1. London, 1917. (2 pp. in Institute Bulletin).

INJURIOUS VERTEBRATES

396—**The Control of Field Voles in Italy.**—SPLENDORE, ALFONSO, in *Rendiconti delle sedute della Reale Accademia dei Lincei, Classe di Scienze fisiche, matematiche e naturali*, Series 5, 2nd. Half year, 1916; Vol. XXV, Part 6, pp. 218-224, and Part 12, pp. 510-512. Rome, 1916. (3 pp. in Institute Bulletin).

516—**The Squirrel as an Enemy of Forest Plants and of Birds.**—D'ANNE, in *Bulletin de la Ligue française pour la protection des oiseaux.*—Abstracted in the *Revue des eaux et forêts*, 5th Series, 15th Year, Vol. IV, No. 1, p. 27. Paris, Jan. 1, 1917.

M. d'Anne has made out a most damaging case against the squirrel. He concludes from his observations that these

rodents are great destroyers of birds. He has seen them disturbing birds while building their nests, destroying and knocking down the finished nests, chasing both laying and sitting birds, breaking eggs, killing the young. They attack not only the small Passeres but also jays, magpies and hawks (those of more combative temperament, however). They steal the food of pheasants and even visit dove-cots and the poultry yards. In the Somme, where squirrels were unknown or rare, birds were very numerous up to recent years but with the advent of these rodents the birds diminished in number and have now nearly disappeared. If one adds to all these misdeeds the fact that the squirrel attacks both deciduous, especially the poplar, and coniferous trees, one cannot do better than support the recommendation made to the Society of French agriculturists that the squirrel be regarded as a pest and its destruction encompassed by landowners and farmers upon their lands, at all times, even by the use of guns.

AGRICULTURAL ECONOMICS

THE ACTIVITY OF THE BELGIAN "BOERENBOND" IN 1915

The powerful organism constituted by the Peasants' League has not interrupted its labours during the German occupation, as we will prove, rapidly sketching its work in 1915.

Speaking generally it is true that everything founded by the *Boerenbond* before the war has survived, and moreover new plans have been realized. Thus the general secretary's report notes the organization of two new agricultural gilds, one in the province of Antwerp, two in Brabant and one in East Flanders. Means of communication had hardly been re-established, in the last months of 1914, when the league's inspectors began once more to travel about the country in order to visit the rural associations and to co-operate, in the words of the report, "in reviving social and economic life in the rural districts". They were entrusted at the same time with the additional duty of collecting information and noting the most urgent needs in order to enable a directing committee to organize committees for relief and nourishment everywhere. Further as soon as it was possible the *Boerenbond*, in agreement with some influential personages in the agricultural world, undertook he defence of the interests of tillers of the soil and participated in the formation of an agricultural section of the national committee fo relief and nourishment which came into being at the end of De ember 1914. Two of its administrators are members of this section and have taken a large part in all its work. The co-operative society, *Agricultural Assistance*, which aims at buying food for live stock and all supplies indispensable to agriculture, was founded towards he end of February, and a delegate of the *Boerenbond* is on its administrative council.

"It was not however enough to create an agricultural section for the whole country: it was necessary also to consider agricultural interests in the different provinces. The want was best supplied by founding in each of them an agricultural sub-section, having an autonomous existence. This was done in the provinces of Brabant, Antwerp and Limbourg among others. The *Boerenbond* had its share in the formation of these three sections, within which it is represented by its delegates".

Until the *Agricultural Assistance* should be able to maintain agriculture with foodstuffs, manures and primary material of every kind, the *Boerenbond* itself undertook to fulfil this task and to reduce to the minimum the difficulties which the agricultural world had to meet.

"The *Boerenbond*—or more accurately its counter for sale and purchase—bought in the first place, for the provinces of Antwerp and Brabant, the food for live stock which the German civil administration granted, at the first distribution, to agriculture in these two provinces, and remitted the food to the agricultural sections. Had there been opportunity it would have been equally zealous to render this service to the other provinces. Soon afterwards it took over from the German civil administration a sufficiently important quantity of oilcakes of which it afterwards made grants in accordance with the instructions of the national agricultural section.

"In agreement with the latter it made a bargain with the *Drogueries et Huileries anversoises* for 2,500 tons of arachis and sesamum oilcakes which were distributed among all the provinces, but did not reach their destination until long afterwards because part of the merchandise was being manufactured at the time of purchase and because the formalities required for its liberation were retarded.

"Hitherto no concentrated food whatever had crossed the frontier. Moved by the distress of agriculture the *Boerenbond* did everything possible to remedy the situation. In the course of February it was

at its own request commissioned by the *Agricultural Assistance* to send a delegate to Holland to treat for the purchase and importation of 4,000 tons of oilcakes. This was a delicate mission but after many difficulties it was satisfactorily concluded.

"These were the only edible oilcakes imported in 1915 in addition to the unimportant quantity bought in Holland in December 1914 by the representatives of the *Boerenbond*".

Thanks to these efforts Belgian agriculturists were more or less provided with various products with which to meet the difficulties in the way of feeding the live stock. The *Boerenbond* then turned its attention to procuring manures.

As early as the spring of 1915 all chemical manures had been seized by the German administration. The *Boerenbond* negotiated and obtained for its members some tons of superphosphates and guano and small quantities of scoria.

It was however even more difficult to encounter the consequences of the seizure of harvests. The *Boerenbond* gave every care to regulating this matter in the best interests of its members.

"As early as the first fortnight of July the *Boerenbond* had occasion to formulate its desires to the German civil administration. It proposed tariffs in harmony with the general situation, giving prices at which the cultivators should themselves buy the goods they needed, and it asked that they should be allowed to retain such quantities of grain as were reasonably necessary for household and farming purposes. In this way it claimed 2200 lb. of oats for each horse, and in this at least obtained satisfaction since the decree ordered an allowance of two and a half kilogrammes a day or 2024 lb. in all. Later this quantity was notably diminished.

"For the rest, the allowance of rye for every head of horned cattle was, as is known, fixed at 16½ lb. a month or a total of 198 lb.—an entirely insufficient amount.

"As regards food for the people the allowance of wheat was 340 grammes (.68 lb.) a day for each person, but producers of rye might retain only a third of this amount of rye, being allowed to buy the other two-thirds of their ration in wheat from the committees.

"The authorization to reserve 198 lb. rye for a head of cattle was a concession, however slight; that of utilizing this quantity at pleasure, instead of being obliged to keep one-twelfth for every month until the next harvest, was another; and finally producers of rye were allowed to take out two-thirds of their ration in rye. In spite of our most persistent efforts it was impossibl to obtain more.

"Although here again results have not been equal to expectation we cannot regret having done our duty. Our gilds, which have seen their efforts partially fail on some occasions, should also argue thus, and should rejoice with us in the least success. The position of our cultivators would, without our and their intervention, have been far worse in many respects."

Thus new difficulties, affecting agriculture and the rural population, arose at every moment. The regulation of the sale of potatoes, the acquisition of seeds and plants, the struggle against the unrestrainedly audacious adulteration of foods for live stock and of manures, the efforts to obtain subsidies for the reinsurance of cattle and horses, the intervention of unemployment funds in favour of unemployed workpeople—these and others were so many problems which the *Boerenbond* attempted to solve, multipliyng all the necessary procedure in relation to the civil and the military authorities. Not the least arduous task was that of helping small cultivators in the districts which have suffered most from the war. To estimate damages, to combat the discouragement of the poor peasants whom the war had ruined, to draw up plans for bringing lands under cultivation and resuming the tilth of abandoned lands, to organise a system of small loans which would particularly favour those most tried, to collaborate in fact in every possible way in the resumption of work and life on this countryside ravaged by the war—this has been the essential aim which the various sections and the directing committee have laboriously pursued. No consideration, including regard for hygiene, has failed to influence the association's conduct and to contribute to the efforts to reconstruct destroyed villages and farms.

"We have made a point," says the report, "of rendering yet another service to the country people who were obliged to reconstruct their houses or farms. We wished to make them understand that in building it is easy for them to observe the rules of comfort and primary notions of hygiene without any consequent increase of expense. There are already in the country too many insanitary dwellings and too many farms constructed in defiance of the rules of good sense.

So much as to the league's general activity. As regards the particular activity of each of the organisms within its framework, this has been no less fruitful; and we wish we could mention all that has been accomplished by the parochial gilds, the farmwives' circles, the federations of horticulturists, the counter for sale and purchase, the inspectorate of milk, the central credit fund and the insurance section.

One of the association's most active branches has been indisputably the *Central Credit Fund.*

The year 1915 was, says the report, one of the most important years it has had

since its formation. Not only was the number of affiliated local funds increased by forty-four but the savings deposits were more numerous than ever and hundreds of small loans were made to cultivators in needy circumstances.

"This considerable increase in the amount of savings deposits in the second year of the war is partly explained by the fact that cultivators have had partially to realize their invested capital. It was impossible for them to procure the desired quantities of manures for their fields and of concentrated food for their live stock. Thanks to the reserves of fertilizing substances preserved in the soil they had generally very satisfactory harvests, and therefore had more liquid cash in hand than usual, but this was to the detriment of the wealth of the soil. They fed their live stock as they could, having no choice but to avoid the expense of purchasing the concentrated foods usually on the market; but the value of their stock was diminished in consequence, and the animals of which they got rid were seldom nor never replaced.

The various insurance and mutual aid organizations continued to do business represented by a very respectable figure. Fire and life insurance and insurance against hail and mortality among live stock perceptibly increased the number of their policies, the amount of the premiums they received and the capital they insured.

THE AMERICAN SOCIETY OF EQUITY

Founded in 1902 at Indianapolis, Indiana, the American Society of Equity is one of a number of kindred bodies working in the central and north-western states for better organization among farmers. From 1902 to 1911 it had tremendous ups and downs—a series of successes and failures.

Its growth has been very rapid in the last four years. The membership is now 100,000. It has 7,146 local unions and is operating in fourteen states—Kentucky, Indiana, Illinois, Wisconsin, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, Wyoming, Montana, Oregon, Washington and Idaho—and has scattered members in other places.

Under the rules of this society a county union comprises five local unions and a state union a minimum of five county unions and 500 members.

So far the work of the American Society of Equity has been mainly educative and has been carried on through meetings of local unions, literature, organizers or otherwise, much as is the educative work of the Grain Growers' Associations in Western Canada. This side of the enterprise seems indeed to have overshadowed its business side, for until the last two years little was done to develop the business organization.

A little more than a year ago the central organization established the American Co-operative Association which is the business organization of the American Society of Equity. It is organized under the Wisconsin State laws. It has already established several branches and transacted a large amount of business. Its first enterprise was to publish *The Organized Farmer* of which the first issue appeared on January 14th, 1915.

The large business that has developed has secured for the association the very lowest possible prices and enabled it to sell to its members approximately at the prices charged by wholesalers to retailers. The quality of the goods is guaranteed, the customer being under no obligation to accept them if the quality be not good.

CONTENTS OF THE INSTITUTE ECONOMIC BULLETIN

In addition to those already dealt with herein, the following is a list of the more important subjects treated in the May number of the International Review of Agricultural Economics. Persons interested in any of the articles in this list may obtain the original bulletin on application to the Institute Branch, so long as the supply for distribution is not exhausted.

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AGRICULTURAL STATISTICS

THE CROPS OF 1917

The following tables contain the official estimates of the production of cereals in the countries which have reported to the Institute:

Countries	1917	1916	Five years' average 1911-15
Wheat—	Bushels	Bushels	Bushels
Spain	141,000,000	152,330,000	125,214,000
France	145,074,000	214,622,000	296,304,000
Ireland	4,347,000	2,827,000	1,834,000
Italy	140,000,000	176,531,000	182,604,000
Netherlands	3,453,000	4,710,000	5,729,000
Sweden	7,497,000	8,979,000	8,610,000
Canada	231,730,000	(a) 262,781,000	254,965,000
United States	659,797,000	639,886,000	806,361,000
India	379,307,000	318,005,000	360,550,000
Japan	26,533,000	28,307,000	24,638,000
Algeria	28,980,000	29,152,000	35,000,000
Totals	1,767,718,000	1,838,130,000	2,101,809,000
Rye—			
Spain	24,366,000	28,782,000	25,147,000
France	27,534,000	35,889,000	44,517,000
Ireland	222,000	192,000	228,000
Italy	4,460,000	5,342,000	5,159,000
Netherlands	11,956,000	11,471,000	15,501,000
Sweden	15,748,000	22,929,000	24,220,000
Canada	4,240,000	(a) 2,876,000	2,326,000
United States	56,044,000	47,383,000	41,399,000
Totals	144.570,000	154,864,000	158,497,000
Barley—			
Spain	76,748,000	86,864,000	74,119,000
France	41,249,000	39,405,000	44,999,000
Ireland	7,872,000	6,537,000	7,264,000
Italy	7,427,000	10,109,000	9,611,000
Netherlands	2,571,000	2,372,000	3,257,000
Sweden	12,264,000	14,621,000	14,492,000
Canada	51,684,000	(a) 42,770,00	47,805,000
United States	201,659,000	180,927,000	197,211,000
Algeria	32,829,000	35,970,000	39,050,000
Totals	434,303,000	419,575,000	437,808,000
Oats—			
Spain	31,104,000	30,272,000	28,311,000
France	223,467,000	267,664,000	304,618,000
Ireland	79,464,000	58,685,000	61,000,000
Italy	31,897,000	24,543,000	32,192,000
Netherlands	17,502,000	18,841,000	19,552,000
Sweden	66,594,000	87,614,000	72,536,000
Canada	393,570,000	(a) 410,211,00	399,644,000
United States	1,580,714,000	1,251,992,000	1,230,499,000
Algeria	17,182,000	12,367,000	12,014,000
Totals	2,441,494,000	2,162,189,000	2,160,366,000
Corn—			
Spain	25,738,000	28,642,000	27,672,000
Switzerland	252,000	152,000	118,000
Canada	6,193,000	(a) 6,282,000	16,240,000
United States	3,210,795,000	2,583,241,000	2,754,164,000
Totals	3,242,978,000	2,618,317,000	2,798,194,000

(a) The 1916 figures for Canada have been revised in accordance with the report of the census of the prairie provinces.

UNITED STATES OCTOBER CROP REPORT

The estimates of production in the United States of crops, other than those given in the above table, are as follows:

	October 1, 1917 indications	December, 1916 estimates	1911–1915 5-year average
Buckwheat, bus.	17,895,000	11,840,000	16,514,000
White potatoes, bus.	452,923,000	285,437,000	362,910,000
Sweet potatoes, bus.	87,244,000	70,955,000	60,257,000
Flax, bus.	11,335,000	15,459,000	18,615,000
Rice, bus.	33,256,000	40,702,000	25,266,000
Tobacco, lbs.	1,243,023,000	1,150,622,000	983,723,000
Cotton, bales.	12,047,000	11,450,000	14,176,000
Peaches, bus.	42,606,000	36,939,000	49,027,000
Pears, bus.	10,848,000	10,377,000	11,341,000
Apples, total crop, bus.	176,620,000	202,245,000	215,572,000
Apples, commercial, barrels.	21,192,000	25,695,000	
Hay, tame, tons.	76,490,000	89,991,000	69,543,000
Hay, wild, tons.	15,225,000	19,795,000	17,044,000
Hay, total, tons.	91,715,000	109,786,000	86,587,000
Sugar beets, tons.	7,832,000	6,228,000	
Kafirs, bus.	98,609,000	50,340,000	
Beans, commercial, bus.	15,814,000	8,846,000	
Onions, fall crop, commercial, bus.	13,554,000	7,853,000	
Cabbages, commercial, tons.	692,000	252,000	

BROOMHALL'S FOREIGN CROP REPORT SUMMARY, OCT. 23, 1917

Russia.—Weather unfavourable, cool and wet. This is against the movement and also autumn sowing, and it is believed that the acreage will be small, as labour is scarce and seed of inferior quality. Agriculturists are discouraged owing to the poor marketing of the last yield.

France.—Weather continues wet and cool and threshing and movement is light. Prices remain high and mills are operating slowly. Agriculture is slow. Foreign arrivals are increasing and importation is important and will continue on an increased scale. America is favoured owing to the shortness of transit and also grading.

Italy.—Weather is against agriculture. Threshing has revealed a very moderate yield. Stocks of foreign wheat are light and native grain is moving slowly. There is great unrest regarding the food question. Foreign needs are large.

Spain.—Wheat is housed and the quality fine, with the yield exceptionally good. Foreign purchases are authorized to maintain reserves.

Balkan States.—Weather is very favourable for agriculture, being moist and warm. Harvesting is reported as being very favourable, with yield and quality good. Stocks are good and exportation overland to the Central Powers continues.

Scandinavian Countries.—Harvesting is finished. Yield and quality poor. Stocks are light and foreign arrivals are small and mostly from America. Food question is very discouraging.

United Kingdom.—Weather is mild and wet. Crops yielded unfavourably, with the quality fair. Foreign supplies are liberal and recent purchases in importing centres liberal.

South Africa.—The corn yield is not up to expectations and harvesting is disappointing. Late frost occurred and ravages of pest were bad in some localities.

Australia.—Weather favourable and crops prospering. Estimates of yield are being raised.

EXPORTS OF MEATS AND ANIMAL PRODUCTS FROM ARGENTINA

Products	1917 1st 3 months	1916 1st 3 months	Year 1916	Year 1915	Year 1914	Year 1913
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Mutton	25,567,000	25,340,000	113,137,000	77,250,000	129,385,000	101,254,000
Beef	206,804,000	212,971,000	942,916,000	799,702,000	813,434,000	807,396,000
Pork	795,000	372,000	2,965,000	1,969,000		
Preserved meat	30,832,000	15,311,000	98,258,000	70,424,000	28,852,000	27,721,000
Salted meat	10,355,000					
Smoked meat	194,000	68,000	2,467,000	469,000	5,240,000	8,620,000
Wool	127,438,000	86,051,000	267,991,000	259,418,000	258,536,000	264,731,000
Sheepskins	7,048,000	5,029,000	36,041,000	47,313,000	32,082,000	44,366,000
Ox hides	53,680,000	42,038,000	219,117,000	198,034,000	172,104,000	191,745,000
Goatskins	1,453,000	1,030,000	7,083,000	5,545,000	3,598,000	5,381,000
Horse hides	3,164,000	1,228,000	8,708,000	5,617,000	3,073,000	2,608,000
Butter	5,002,000	6,261,000	12,502,000	10,192,000	7,676,000	8,342,000
Fat and Tallow	27,999,000	21,821,000	107,332,000	109,936,000	112,929,000	139,087,000

The number of live stock in Argentina in 1913 were: Cattle 30,796,447, horses 9,366,455, sheep 81,485,149, goats 4,563,808, pigs 3,197,337.

EXPORTS OF CHILLED AND FROZEN MEAT FROM BRAZIL

Destination	1917 First 4 months	1916 First 4 months	Year 1916	Year 1915
	Pounds	Pounds	Pounds	Pounds
United States	200,000	2,435,000	5,481,000	2,168,000
France		5,447,000	9,800,000	210,000
Great Britain	1,995,000	4,455,000	11,961,000	7,889,000
Italy	49,740,000	1,394,000	33,517,000	4,451,000
Gibraltar for orders			10,659,000	
	51,935,000	13,731,000	71,418,000	14,718,000

The number of live stock in Brazil in 1916 were: Cattle 28,962,180; Pigs 17,329,210; Goats 6,919550; Sheep 7,204,920.

EXPORTS OF MEAT AND ANIMAL PRODUCTS FROM AUSTRALIA

Products	First four months		Year 1915–16	1914–15	1913-14	1912–13	1911–12
	1916–17	1915–16					
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Beef	147,200,000	76,148,000	114,675,000	292,065,000			
Mutton and lamb	60,309,000	36,923,000	38,343,000	193,263,000	204,930,000	115,371,000	129,568,000
Preserved meat	11,556,000	12,101,000	14,268,000	57,773,000			
Butter	56,750,000	12,298,000	16,722,000	54,021,000	75,795,000	66,679,000	101,721,000
Greasy wool	231,300,000	335,636,000	408,620,000	443,951,000	531,431,000	557,829,000	578,820,000
Scoured wool	40,506,000	57,108,000	79,882,000	64,949,000	64,450,000	63,253,000	71,770,000

Number of live stock in Australia in 1915: cattle 9,925,150, sheep 69,272,480.

EXPORTS OF FROZEN MEAT AND ANIMAL PRODUCTS FROM NEW ZEALAND

Meat	Year ending May 31, 1917	Year ending May 31, 1916	Animal products	Year ending May 31, 1917	Year ending May 31, 1916
	Pounds	Pounds		Pounds	Pounds
Beef	104,037,000	102,340,000	Wool	154,329,000	184,481,000
Mutton	142,943,000	153,943,000	Hides (number)	150,567	300,225
Lamb	85,644,000	122,797,000	Sheepskins (in the wool)	1,429,000	3,060,000
Mutton and lamb in quarters	846,000	3,611,000	Sheepskins (shorn)	17,679,000	23,249,000
			Butter	39,809,000	45,040,000
			Cheese	100,080,000	109,082,000
			Tallow	49,105,000	46,648,000

Number of live stock in New Zealand in 1916: cattle 2,387,036, sheep 24,788,150, pigs 292,115.

LIVE STOCK STATISTICS

Numbers of live stock in the Netherlands, Norway and Canada:

Classification	April 11, '17	June, 1913
Netherlands:		
Cattle	2,301,007	2,096,599
Sheep	520,810	842,018
Pigs	1,185,565	1,350,204
Norway:	Sept. 30, '16	Sept. 30, '15
Horses	189,175	186,217
Cattle	1,119,306	1,120,517
Sheep	1,281,030	1,329,559
Goats	230,055	240,303
Pigs	221,217	208,522

Referring to the live stock statistics given at page 436 of the May number of THE GAZETTE the following revised figures for the number of live stock in Canada in 1916 and 1917 should be noted. The revision has been made in accordance with the report of the census of the Prairie Provinces, and the improved methods of collecting statistics in Quebec, Alberta, Saskatchewan and British Columbia:

Canada:	1917	1916
Horses	3,412,749	3,258,342
Milch cows	3,202,283	2,833,433
Other cattle	4,718,657	3,760,718
Sheep	2,369,358	2,022,941
Swine	3,619,382	3,474,840

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